

THE APPLETON ARITHMETICS



PRIMARY
BOOK

THE APPLETON ARITHMETICS

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PREFACE

THIS book has for its purpose to teach arithmetic from the standpoint of the child. To accomplish this purpose it presents arithmetic topically, systematically, and in well-graded steps. It is a basic text-book in primary arithmetic designed for the child to use—not a manual of method for the teacher.

In emphasizing arithmetic as a subject of study this book does not ignore the real uses of number; on the contrary, it draws liberally for its illustrations and problems upon other subjects and activities interesting to the child. The child's games, purchases, possessions, and his knowledge of form, measurement, and comparison are made to serve in interpreting the relations of numbers.

The last ten years have served to test so thoroughly modern arithmetic in the classroom that it is not difficult to-day to select that which will endure. THE APPLETON ARITHMETICS are conservative, but not reactive. They represent what is sane in quality and safe in quantity for every-day classroom use under average conditions.

To facilitate the child's mastery of arithmetic, the important relations and principles are developed by "Preparatory" work consisting of suggestive illustrations, questions, and statements. This pedagogical feature, together with simplicity of statement, careful grading, and convenient arrangement, will commend the book, it is hoped, to the teaching profession. No attempt is made to limit the teacher in the matter of device or method.

The book is the child's text, and as such should not, and does not, contain embarrassing admonitions "to the teacher."

This volume, called the PRIMARY ARITHMETIC, is planned to cover the first four years' work. Chapter I is a systematic review of the arithmetic usually taught informally in the first two years, but represents the *minimum* requirements of standard courses of study. The development is merely suggestive, while the drill is sufficient for a thorough review. The remaining chapters may be taken as half-years of work, although not necessarily. The authors design Chapters II and III for the third year, and Chapters IV and V for the fourth year. Although each chapter, or half-year of work, contributes its advance to the basic topics, Processes with Integers, Fractions, and Measurement, each year has its special subject of emphasis—namely, the Multiplication and Division Tables in the third year; Fractions, Decimals, and Measurement in the fourth year.

Other features which the teacher may appreciate as fitting this book for classroom use are the frequent and systematic reviews by topic and by chapter; the classified oral and written work, properly labeled; the well-balanced abstract and concrete drill; the classified tables of measurement; and the attempt to supplement and strengthen the text by careful typography and effective illustrations.

THE AUTHORS.

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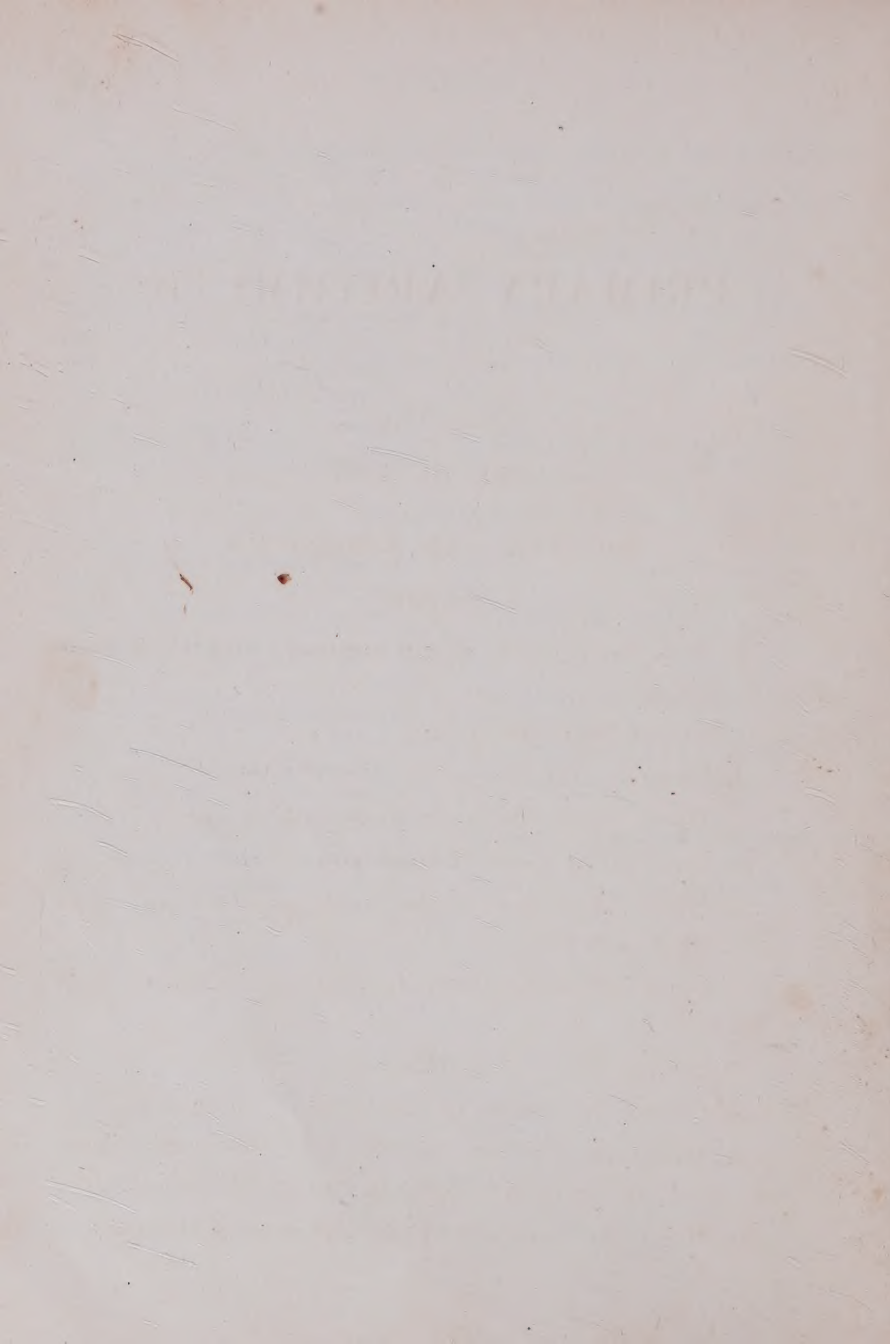
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PRIMARY ARITHMETIC

CHAPTER I INTRODUCTORY

NOTATION AND NUMERATION

Counting

1. You may learn about numbers and their uses by counting.

1. Count from one to ten.

2. Count as far as you can beyond ten.

3. How many words are there in this line?

4. How many years old are you?

5. Name the days of the week. How many days are there in a week?

6. On how many days do you go to school in a week?

7. Count the lines on this page.

8. Count the letters in the word "Arithmetic."

9. How many letters are there in the word "number"? How many are there in the word "counting"?

10. Read the numbers at the left side of the page.

The Use of Figures

2. The figures with which numbers are written are

zero	one	two	three	four	five	six	seven	eight	nine
0	1	2	3	4	5	6	7	8	9

Practice writing the figures until you can form them correctly.

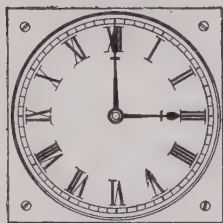
1. Read :

2	1	6	4	3	5	9	8	0	7
12	20	15	18	10	13	14	11	19	16

2. Write in figures these numbers :

One	Five	Nine	Thirteen	Seventeen
Two	Six	Ten	Fourteen	Eighteen
Three	Seven	Eleven	Fifteen	Nineteen
Four	Eight	Twelve	Sixteen	Twenty

3. Write the figure for *naught* or *not any*.



Roman Notation

3. The clock face shows another way of writing numbers.

The letters I, V, X, when used as numbers, are called **Roman numerals**.

In Roman numbers we write :

I for 1.	V for 5.	IX for 9.
II for 2.	VI for 6.	X for 10.
III for 3.	VII for 7.	XI for 11.
IIII, or IV, for 4.	VIII for 8.	XII for 12.

Read the chapter numbers in this book.

Ordinals

4. These eight chairs were placed in a row from left to right.



1. Beginning at the left, point to the first chair. Point to the second. To the third. To the fourth. To the seventh. To the fifth. To the eighth.

2. Point to the first row of seats in your school-room. To the second row. To the third. To the fourth.

3. Point to the first pupil in the second row of seats. Point to the second pupil in the second row. To the third pupil in the second row.

4. In the row of chairs above begin at the right and point to the third chair. The fourth. The second. The seventh. The eighth.

5. Name the second number from the left in the top row following:

11	12	13	14	15
16	17	18	19	20

6. What is the fifth number in the top row?

7. The fifth in the bottom row?

8. What is the fourth number in the bottom row?

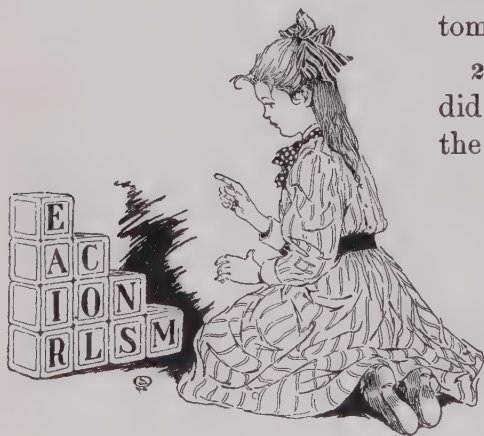
9. Counting from the right, what number in the bottom row is second? What is third? What is fifth?

ADDITION AND SUBTRACTION

Addition

5. PREPARATORY.

1. Mary arranged some cubes so as to make a set of steps like that in the picture. How many cubes did she use for the bottom step?



2. How many cubes did she use to build the second step?

3. How many cubes did she use for the first two steps?

4. How many did she use to build the third step?

5. How many did she use for the second and third steps together?

6. How many did she use altogether for the first, second, and third steps?

7. How many cubes did she use for the fourth step?

8. How many cubes are there in the four steps?

9. How many cubes more were used for the bottom step than for the second?

TABLES

Copy the tables and fill the blanks :

1 and 1 are ()	2 and 1 are ()	3 and 1 are ()
1 and 2 are ()	2 and 2 are ()	3 and 2 are ()
1 and 3 are ()	2 and 3 are ()	3 and 3 are ()
1 and 4 are ()	2 and 4 are ()	3 and 4 are ()
1 and 5 are ()	2 and 5 are ()	3 and 5 are ()
1 and 6 are ()	2 and 6 are ()	3 and 6 are ()
1 and 7 are ()	2 and 7 are ()	3 and 7 are ()
1 and 8 are ()	2 and 8 are ()	3 and 8 are ()
1 and 9 are ()	2 and 9 are ()	3 and 9 are ()

4 and 1 are ()	5 and 1 are ()	6 and 1 are ()
4 and 2 are ()	5 and 2 are ()	6 and 2 are ()
4 and 3 are ()	5 and 3 are ()	6 and 3 are ()
4 and 4 are ()	5 and 4 are ()	6 and 4 are ()
4 and 5 are ()	5 and 5 are ()	6 and 5 are ()
4 and 6 are ()	5 and 6 are ()	6 and 6 are ()
4 and 7 are ()	5 and 7 are ()	6 and 7 are ()
4 and 8 are ()	5 and 8 are ()	6 and 8 are ()
4 and 9 are ()	5 and 9 are ()	6 and 9 are ()

7 and 1 are ()	8 and 1 are ()	9 and 1 are ()
7 and 2 are ()	8 and 2 are ()	9 and 2 are ()
7 and 3 are ()	8 and 3 are ()	9 and 3 are ()
7 and 4 are ()	8 and 4 are ()	9 and 4 are ()
7 and 5 are ()	8 and 5 are ()	9 and 5 are ()
7 and 6 are ()	8 and 6 are ()	9 and 6 are ()
7 and 7 are ()	8 and 7 are ()	9 and 7 are ()
7 and 8 are ()	8 and 8 are ()	9 and 8 are ()
7 and 9 are ()	8 and 9 are ()	9 and 9 are ()

WRITTEN EXERCISES

Copy the following and add:

1.	1	1	1	1	1	1	1	1
	1	2	3	4	5	6	7	8

2.	2	2	2	2	2	2	2	2
	1	2	3	4	5	6	7	9

3.	3	3	3	3	3	3	3	3
	1	2	3	4	5	6	7	8

4.	4	4	4	4	4	4	4	4	4
	1	2	3	4	5	6	7	8	9

5.	5	5	5	5	5	5	5	5
1	2	3	4	5	6	7	8	9

6.	6	6	6	6	6	6	6	6
	1	2	3	4	5	6	7	8

7.	7	7	7	7	7	7	7	7
	1	2	3	4	5	6	7	8

8.	8	8	8	8	8	8	8	8
	1	2	3	4	5	6	7	9

9.	9	9	9	9	9	9	9	9
	1	2	3	4	5	6	7	8

6. The sign $+$ is used for "and."

Thus, "3 and 5" may be written $3 + 5$.

The sign $=$ is used for "are."

Thus, "3 and 5 are 8" may be written $3 + 5 = 8$.

WRITTEN EXERCISES

Write the following, using the signs $+$ and $=$:

- | | |
|-------------------|--------------------|
| 1. 1 and 2 are 3. | 6. 1 and 3 are 4. |
| 2. 1 and 4 are 5. | 7. 1 and 8 are 9. |
| 3. 2 and 2 are 4. | 8. 2 and 3 are 5. |
| 4. 3 and 3 are 6. | 9. 3 and 4 are 7. |
| 5. 4 and 4 are 8. | 10. 5 and 3 are 8. |

Subtraction

7. PREPARATORY.

1. $1 + 2 = 3$. Then 3 less 1 $= 2$, and 3 less 2 $= 1$.
2. $1 + 3 = 4$. Then 4 less 1 $= 3$, and 4 less 3 $= 1$.
3. $2 + 3 = 5$. Then 5 less 2 $= 3$, and 5 less 3 $= 2$.
4. $4 + 3 = 7$. Then 7 less 3 $= 4$, and 7 less 4 $= 3$.

8. The sign $-$ is used for "less."

Thus, "7 less 3 are 4" may be written $7 - 3 = 4$.

ORAL EXERCISES

- | | |
|---------------------|----------------------|
| 1. $7 - 3 = () ?$ | 6. $7 - 4 = () ?$ |
| 2. $12 - 4 = () ?$ | 7. $12 - 7 = () ?$ |
| 3. $10 - 2 = () ?$ | 8. $10 - 6 = () ?$ |
| 4. $18 - 8 = () ?$ | 9. $18 - 9 = () ?$ |
| 5. $17 - 8 = () ?$ | 10. $17 - 9 = () ?$ |

TABLES

Copy the tables and fill the blanks :

$2 - 1 = (1)$

$3 - 1 = (2)$

$4 - 1 = (3)$

$5 - 1 = (4)$

$6 - 1 = (5)$

$7 - 1 = (6)$

$8 - 1 = (7)$

$9 - 1 = (8)$

$10 - 1 = (9)$

$3 - 2 = (1)$

$4 - 2 = (2)$

$5 - 2 = (3)$

$6 - 2 = (4)$

$7 - 2 = (5)$

$8 - 2 = (6)$

$9 - 2 = (7)$

$10 - 2 = (8)$

$11 - 2 = (9)$

$4 - 3 = ()$

$5 - 3 = ()$

$6 - 3 = ()$

$7 - 3 = ()$

$8 - 3 = ()$

$9 - 3 = ()$

$10 - 3 = ()$

$11 - 3 = ()$

$12 - 3 = ()$

$5 - 4 = (1)$

$6 - 4 = (2)$

$7 - 4 = (3)$

$8 - 4 = (4)$

$9 - 4 = (5)$

$10 - 4 = (6)$

$11 - 4 = (7)$

$12 - 4 = (8)$

$13 - 4 = (9)$

$6 - 5 = ()$

$7 - 5 = ()$

$8 - 5 = ()$

$9 - 5 = ()$

$10 - 5 = ()$

$11 - 5 = ()$

$12 - 5 = ()$

$13 - 5 = ()$

$14 - 5 = ()$

$7 - 6 = ()$

$8 - 6 = ()$

$9 - 6 = ()$

$10 - 6 = ()$

$11 - 6 = ()$

$12 - 6 = ()$

$13 - 6 = ()$

$14 - 6 = ()$

$15 - 6 = ()$

$8 - 7 = (1)$

$9 - 7 = (2)$

$10 - 7 = (3)$

$11 - 7 = (4)$

$12 - 7 = (5)$

$13 - 7 = (6)$

$14 - 7 = (7)$

$15 - 7 = (8)$

$16 - 7 = (9)$

$9 - 8 = ()$

$10 - 8 = ()$

$11 - 8 = ()$

$12 - 8 = ()$

$13 - 8 = ()$

$14 - 8 = ()$

$15 - 8 = ()$

$16 - 8 = ()$

$17 - 8 = ()$

$10 - 9 = ()$

$11 - 9 = ()$

$12 - 9 = ()$

$13 - 9 = ()$

$14 - 9 = ()$

$15 - 9 = ()$

$16 - 9 = ()$

$17 - 9 = ()$

$18 - 9 = ()$

WRITTEN EXERCISES

Copy the following and fill the blanks :

- | | |
|-----------------------------|-----------------------------|
| 1. $13 - 4 = (\quad)$. | 24. $15 - 6 = (\quad)$. |
| 2. $18 - 9 = (\quad)$. | 25. $16 - 7 = (\quad)$. |
| 3. $11 - 9 = (\quad)$. | 26. $13 - 9 = (\quad)$. |
| 4. $9 - 7 = (\quad)$. | 27. $10 - 2 = (\quad)$. |
| 5. $11 - 8 = (\quad)$. | 28. $13 - 8 = (\quad)$. |
| 6. $15 - 7 = (\quad)$. | 29. $14 - 9 = (\quad)$. |
| 7. $16 - 8 = (\quad)$. | 30. $12 - 6 = (\quad)$. |
| 8. $17 - 9 = (\quad)$. | 31. $13 - 7 = (\quad)$. |
| 9. $15 - 8 = (\quad)$. | 32. $14 - 6 = (\quad)$. |
| 10. $17 - 8 = (\quad)$. | 33. $17 - 7 = (\quad)$. |
| 11. $16 - 9 = (\quad)$. | 34. $13 - 5 = (\quad)$. |
| 12. $15 - 9 = (\quad)$. | 35. $14 - 7 = (\quad)$. |
| 13. $12 - 5 = (\quad)$. | 36. $12 - 9 = (\quad)$. |
| 14. $17 - 9 = (\quad)$. | 37. $12 - 10 = (\quad)$. |
| 15. $15 - 6 = (\quad)$. | 38. $16 - 5 = (\quad)$. |
| 16. $14 - 8 = (\quad)$. | 39. $13 - 6 = (\quad)$. |
| 17. $17 - 10 = (\quad)$. | 40. $12 - 7 = (\quad)$. |
| 18. $15 - 5 = (\quad)$. | 41. $11 - 7 = (\quad)$. |
| 19. $14 - 5 = (\quad)$. | 42. $14 - 10 = (\quad)$. |
| 20. $16 - 10 = (\quad)$. | 43. $11 - 6 = (\quad)$. |
| 21. $17 - 5 = (\quad)$. | 44. $12 - 8 = (\quad)$. |
| 22. $13 - 10 = (\quad)$. | 45. $14 - 4 = (\quad)$. |
| 23. $16 - 6 = (\quad)$. | 46. $11 - 10 = (\quad)$. |

REVIEW AND PRACTICE

1. Clara had 3 books, and Mary had 4. How many had they together?

2. 5 books and 3 books are how many books?

3. How many are 6 pencils and 7 pencils?

4. George had 12 marbles and lost 7. How many had he left?

5. From a row of 14 chairs, 7 were taken away. How many were left?

6. Charles had 17 pages to read, of which he has read 8. How many has he yet to read?

7. Ralph made 9 lines on the board, and John made 9 more. How many lines did they make altogether?

8. From 16 lines, 9 are erased. How many lines remain?

9. In a row of 15 pupils, 7 are girls. How many are boys?

10. In a class of 14 pupils, 8 are seated. How many are standing?

11. Frank learned 8 words on Monday and 9 words on Tuesday. How many did he learn in the two days?

12. If 17 words are written and 9 of them erased, how many are left?

13. If 8 words are erased from 19, how many are left?

14. Susie paid 5 cents to ride in the car and 8 cents for a tablet. How much did she spend altogether?

15. Beginning with 2, count by 3's to 20. Thus: 2, 5, 8, 11, and so on.

16. Beginning with 2, count by 4's to 18.

17. Beginning with 3, count by 5's to 18. Beginning with 2, count by 6's to 20.

18. Beginning with 20, count backward by 2's. Thus: 20, 18, 16, and so on.

19. Beginning with 20, count backward by 3's to 2.

20. Beginning with 20, count backward by 5's. By 4's. By 6's. By 7's. By 8's. By 9's.

21. Beginning with 1, count forward to 18 by 2 and by 3. Thus: 1, 3, 6, 8, 11, and so on.

22. Beginning with 1, count forward by 3 and by 2.

23. Beginning with 2, count forward by 4 and by 5.

24. Beginning with 20, count backward by 3 and by 2. By 2 and by 3. By 4 and by 5. By 3 and by 5.

25. Name the 10 figures used for counting numbers.

26. What letters are used in writing Roman numbers?

27. Ruth bought a pencil for 3 cts., a book for 10 cts., and a pen for 4 cts. How much did she pay for all?

28. Henry spelled 9 words and Charles spelled 8. How many did they both spell?

29. Ralph had 16 cts. and spent 7 cts. for some fruit. How many cents had he left?

MULTIPLICATION

9. PREPARATORY.

1. Count by twos to 10. To 14. To 16. To 20.
2. Count by threes to 9. To 12. To 15. To 18.
3. Count by fours to 20. By fives to 20.

ORAL EXERCISES

State the sum for each column in these tables :

1.	<table><tr><td></td><td>2</td></tr><tr><td>2</td><td>2</td></tr><tr><td>2</td><td>2</td></tr></table>		2	2	2	2	2	2.	<table><tr><td></td><td>3</td></tr><tr><td>3</td><td>3</td></tr><tr><td>3</td><td>3</td></tr></table>		3	3	3	3	3	3.	<table><tr><td></td><td>4</td></tr><tr><td>4</td><td>4</td></tr><tr><td>4</td><td>4</td></tr></table>		4	4	4	4	4	4.	<table><tr><td></td><td>5</td></tr><tr><td>5</td><td>5</td></tr><tr><td>5</td><td>5</td></tr></table>		5	5	5	5	5	5.	<table><tr><td></td><td>6</td></tr><tr><td>6</td><td>6</td></tr><tr><td>6</td><td>6</td></tr></table>		6	6	6	6	6
	2																																						
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Solve :

6. How many sides has the triangle?

7. If each side is 2 in. long, what is the distance around the triangle?

8. What is the distance around the triangle if each side is 3 in.? 4 in.? 5 in.?

9. How many sides has a square?

10. If each side is 2 in. long, what is the distance around the square?

11. What is the distance around the square if each side is 3 in.? 4 in.? 5 in.?

12. How many equal sticks are needed to make a square? To make 3 squares? 2 squares? 5 squares? 4 squares?



Find the sum for each column in these tables :

13.

		3
	3	3
3	3	3
3	3	3

14.

		4
	4	4
4	4	4
4	4	4

15.

		5
	5	5
5	5	5
5	5	5

10. A sum like $3 + 3 + 3 + 3 = 12$ may be read :
 “Four 3’s are 12,” or, “4 times 3 = 12.”

The sign \times is used for the word “times.”

Thus, “4 times 3 are 12,” or, “Four 3’s are 12,” is written
 $4 \times 3 = 12$.”

TABLES

Copy the tables and fill the blanks :

$1 \times 2 = (\quad)$	$1 \times 4 = (\quad)$	$1 \times 8 = (\quad)$
$2 \times 2 = (\quad)$	$2 \times 4 = (\quad)$	$2 \times 8 = (\quad)$
$3 \times 2 = (\quad)$	$3 \times 4 = (\quad)$	
$4 \times 2 = (\quad)$	$4 \times 4 = (\quad)$	$1 \times 9 = (\quad)$
$5 \times 2 = (\quad)$	$5 \times 4 = (\quad)$	$2 \times 9 = (\quad)$
$6 \times 2 = (\quad)$		
$7 \times 2 = (\quad)$	$1 \times 5 = (\quad)$	$1 \times 10 = (\quad)$
$8 \times 2 = (\quad)$	$2 \times 5 = (\quad)$	$2 \times 10 = (\quad)$
$9 \times 2 = (\quad)$	$3 \times 5 = (\quad)$	
$10 \times 2 = (\quad)$	$4 \times 5 = (\quad)$	
$1 \times 3 = (\quad)$	$1 \times 6 = (\quad)$	
$2 \times 3 = (\quad)$	$2 \times 6 = (\quad)$	
$3 \times 3 = (\quad)$	$3 \times 6 = (\quad)$	
$4 \times 3 = (\quad)$		
$5 \times 3 = (\quad)$	$1 \times 7 = (\quad)$	
$6 \times 3 = (\quad)$	$2 \times 7 = (\quad)$	

ORAL EXERCISES

Multiply :

1. 6	3. 3	5. 4	7. 2	9. 2	11. 7
$\times 3$	$\times 6$	$\times 5$	$\times 8$	$\times 10$	$\times 2$

2. 9	4. 8	6. 2	8. 4	10. 3	12. 3
$\times 2$	$\times 2$	$\times 6$	$\times 3$	$\times 3$	$\times 5$

Solve :

13. How much is a single fare on the street car ?

14. How much are 2 such fares ? 3 such fares ?
4 fares ?15. George and his sister rode in the car to school.
If the fare is five cents, how much did it cost them ?16. Willard took the car to and from the store and
made a ten-cent purchase ; he used the tickets shownin the picture.
How much did
he spend alto-
gether ?17. What is the cost of two tickets at 5 cents each ?
Of 4 tickets ? Of 3 tickets ?18. When tickets are 3 cents each, what is the cost
of 3 tickets ? Of 5 tickets ? Of 6 tickets ? Of 4 ?19. What change is left from 20 cents after paying
for 2 five-cent tickets ? After paying for 3 five-cent
tickets ? For 4 three-cent tickets ?20. Lucile takes 2 friends for a trolley ride ; they
go to the park and return. How much does she pay
in three-cent fares ?

21. Mark bought 7 two-cent pencils and gave the clerk 20 cents. What change did he receive?

22. How much more would a ten-cent engine cost than 2 four-cent cars?

23. Mary bought 2 eight-cent books and 2 two-cent pencils. How much did they all cost?

24. Mark gave his brother 6 three-cent marbles and 1 one-cent marble. How much did they all cost?

25. When milk is 4 cents a quart, how much would 4 quarts cost?

26. What is the cost of 3 three-cent dolls and 1 ten-cent doll's carriage?

27. Which costs more and how much, 2 seven-cent pencils or 3 five-cent pens?

28. Susie bought 2 yards of calico at 10 cents a yard. How many cents did the cloth cost her?

29. How many equal sticks would it take to make 3 triangles and 2 squares?

30. If cookies are two for one cent, how many could Mary buy with 8 cents? How many would she have left, if she should give Susie four of the cookies?

31. If one box holds 6 pencils, how many pencils would 3 boxes hold?

32. Mary gave Susie 3 apples and Tom 2 times as many. How many did she give to Tom? How many did she give to both?

33. Tom put 3 cents into his bank every day. How much did he put into it in 6 days?

DIVISION

11. PREPARATORY.

1. How many twos in 8? How many twos in 12?
In 6? In 10? In 16? In 20?

2. How many threes in 6? In 12? In 9? In 15?
In 18?

3. How many fours in 12? In 8? In 16? In 20?

4. How many fives in 20? How many fours in 20?

5. How many separate triangles will 6 equal sticks make? 15 equal sticks? 12 equal sticks?

6. How many squares will 8 equal sticks make? 16 equal sticks? 20 equal sticks? 12 equal sticks?

7. How many five-cent car fares will 20 cents pay for? How many will 15 cents pay for? 10 cents?

12. $3 \times 4 = 12$, means that 12 is 3 fours or 4 threes, from which we see that 12 divided by 3 is 4, or 12 divided by 4 is 3.

13. The sign \div is used for "divided by."

Thus, "6 divided by 2 are 3" may be written $6 \div 2 = 3$.

WRITTEN EXERCISES

Copy, using the signs \div and $=$:

1. 20 divided by 5 are 4; 20 divided by 4 are 5.

2. 15 divided by 3 are 5; 15 divided by 5 are 3.

3. 18 divided by 2 are 9; 18 divided by 9 are 2.

4. 16 divided by 2 are 8; 16 divided by 8 are 2.

TABLES

Copy and fill out the tables:

$2 \times 2 = 4$	$4 \div 2 = (\quad).$
$3 \times 2 = 6$	$6 \div 2 = (\quad).$
$4 \times 2 = 8$	$8 \div 2 = (\quad).$
$5 \times 2 = 10$	$10 \div 2 = (\quad).$
$6 \times 2 = 12$	$12 \div 2 = (\quad).$
$7 \times 2 = 14$	$14 \div 2 = (\quad).$
$8 \times 2 = 16$	$16 \div 2 = (\quad).$
$9 \times 2 = 18$	$18 \div 2 = (\quad).$
$10 \times 2 = 20$	$20 \div 2 = (\quad).$
$2 \times 3 = 6$	$6 \div 3 = (\quad).$
$3 \times 3 = 9$	$9 \div 3 = (\quad).$
$4 \times 3 = 12$	$12 \div 3 = (\quad).$
$5 \times 3 = 15$	$15 \div 3 = (\quad).$
$6 \times 3 = 18$	$18 \div 3 = (\quad).$
$2 \times 4 = 8$	$8 \div 4 = (\quad).$
$3 \times 4 = 12$	$12 \div 4 = (\quad).$
$4 \times 4 = 16$	$16 \div 4 = (\quad).$
$5 \times 4 = 20$	$20 \div 4 = (\quad).$
$2 \times 5 = 10$	$10 \div 5 = (\quad).$
$3 \times 5 = 15$	$15 \div 5 = (\quad).$
$4 \times 5 = 20$	$20 \div 5 = (\quad).$
$2 \times 6 = 12$	$12 \div 6 = (\quad).$
$3 \times 6 = 18$	$18 \div 6 = (\quad).$
$2 \times 7 = 14$	$14 \div 7 = (\quad).$
$2 \times 8 = 16$	$16 \div 8 = (\quad).$
$2 \times 9 = 18$	$18 \div 9 = (\quad).$
$2 \times 10 = 20$	$20 \div 10 = (\quad).$

WRITTEN EXERCISES

Copy and fill the blanks :

1. $15 \div 3 = ()$. 5. $18 \div 3 = ()$. 9. $14 \div 2 = ()$.
 2. $15 \div 5 = ()$. 6. $16 \div 4 = ()$. 10. $18 \div 2 = ()$.
 3. $12 \div 3 = ()$. 7. $20 \div 5 = ()$. 11. $12 \div 2 = ()$.
 4. $12 \div 4 = ()$. 8. $20 \div 2 = ()$. 12. $10 \div 5 = ()$.

14. $2 \overline{)8}$ asks "How many 2's in 8?"

ORAL EXERCISES

Answer these questions :

- | | | | |
|-----------------------|-----------------------|------------------------|------------------------|
| 1. $2 \overline{)10}$ | 5. $3 \overline{)9}$ | 9. $2 \overline{)18}$ | 13. $3 \overline{)18}$ |
| 2. $4 \overline{)16}$ | 6. $2 \overline{)20}$ | 10. $5 \overline{)15}$ | 14. $6 \overline{)18}$ |
| 3. $5 \overline{)10}$ | 7. $4 \overline{)20}$ | 11. $5 \overline{)20}$ | 15. $8 \overline{)16}$ |
| 4. $3 \overline{)15}$ | 8. $6 \overline{)12}$ | 12. $9 \overline{)18}$ | 16. $2 \overline{)14}$ |

Solve :

17. Clarence divided 4 apples equally between two friends. How many did he give to each friend?

18. 9 sticks are placed in 3 equal piles. How many in each pile?

19. 12 books are placed in 4 equal piles. How many in each pile?

20. When 12 books are placed in 3 equal piles, how many in each pile?

21. In a game of "All Ready" 14 boys are divided equally into two sides. How many on each side?

22. 18 pupils are seated in 3 equal rows. How many pupils in each row?

23. 15 pupils are seated in 5 equal rows. How many pupils in each row?

24. How many three-cent pencils can be bought for 12 cents? For 9 cents? For 15 cents? For 18 cents?

25. There are 12 cakes in a tin having 6 rows. How many cakes in each row?

26. How many two-cent cakes can be bought for 10 cents? For 18 cents? For 16 cents? For 12 cents?

27. 18 marbles are divided equally among 3 boys. How many has each?

28. If each pupil is to plant 3 beans, how many pupils can be supplied from 12 beans? From 9 beans? From 18 beans? From 15 beans?

29. Willard paid 16 cents for 4 bunches of radishes. How much did they cost him per bunch?

30. A piece of cloth 14 yards long was divided into 7 equal pieces. How long was each piece?

31. 18 pencils are to be divided equally among 9 children. How many will each child get?

32. If the distance around a square is 16 inches, how long is one side?

33. How many soldiers at 8 cents each can be bought for 16 cents?

34. If toy soldiers cost 4 cents each, how many can be bought for 20 cents?

35. There are 9 girls and 11 boys playing "Prisoners' Base." In order to have the two sides equal, how many children must be on each side?

Divide:

$$1. \ 2\overline{)8} \quad 2\overline{)10} \quad 2\overline{)16} \quad 2\overline{)12} \quad 2\overline{)6} \quad 2\overline{)18} \quad 2\overline{)20}$$

$$2. \ 3\overline{)6} \quad 3\overline{)9} \quad 3\overline{)12} \quad 3\overline{)18} \quad 3\overline{)3} \quad 3\overline{)15} \quad 2\overline{)14}$$

$$3. \ 4\overline{)16} \quad 4\overline{)12} \quad 4\overline{)20} \quad 5\overline{)15} \quad 5\overline{)10} \quad 5\overline{)5} \quad 5\overline{)20}$$

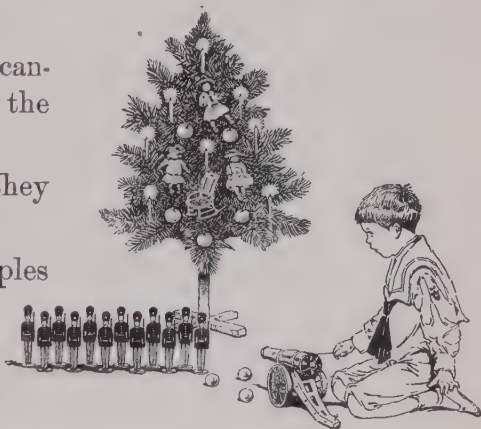
Solve:

4. How many candles are there on the Christmas tree?

5. What did they cost at 2 for a cent?

6. Count the apples on the tree.

7. What did the apples cost at 2 cents each?



8. How many more candles are there than apples?

9. Which cost the more? How much?

10. How many dolls are there on the tree? What did they cost at 3 cents each?

11. Ruth received one doll and the five-cent doll chair. How much did these presents cost?

12. Lucy received the other 2 dolls and an eight-cent doll's bed. How much did these cost?

13. The 12 wooden soldiers on the floor were for Frank. How many more soldiers than dolls are there?

14. Each of the children receive a five-cent rubber ball. How much did the 3 balls cost?

15. The ten-cent cannon was also Frank's present. What was the cost of the cannon and two rubber balls?

16. What is the cost of a ten-cent engine and a set of ten-cent blocks?

17. Tom had 19 marbles; he put 5 in his pocket and gave the rest to his brother. How many did the brother get?

18. Charles earned 5 cents by doing an errand and 8 cents by selling papers. How much did he earn in all?

19. Minnie bought a glass of lemonade for herself and one for each of two friends. What did it cost her at 5 cents a glass?

20. A man drove 15 miles in 3 hours. How many miles an hour did he travel?

21. Chester rides to and from school on the car. If the fare one way is 3 cents, how much would it cost him a round trip? How much would he spend for car-fare in 3 days?

22. When 2 yards of tape cost 4 cents, what does 1 yard cost? What do 6 yards cost?

23. What is the cost of 2 rubber balls at 5 cents each and a top at 6 cents?

24. A boat traveled 20 miles in 4 hours. How many miles did it travel per hour?

25. How many 3-cent pencils can be bought for 12 cts.?

FRACTIONS

Halves and Fourths

15. Lucy drew a square and divided it into two equal parts. She then shaded one of these parts.



1. In the picture point to the shaded part of the square.

2. Point to the part not shaded.

One-half of anything is one of its two equal parts.

Ralph drew a square and divided it into four equal parts. He painted one of these blue. He drew a circle and did the same to it.



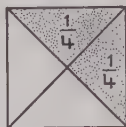
3. In the picture point to the shaded part of the square.

4. Point to the shaded part of the circle.

One-fourth of anything is one of its four equal parts.

5. How many fourths of this square are shaded?

6. How many fourths of it are not shaded?



7. How many fourths in a whole square?

8. If Ralph had painted another fourth of the square, what part of the square would he have painted? How many fourths in one half? In two halves? In one whole thing?

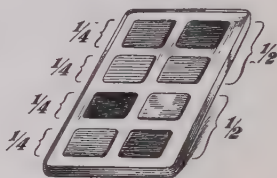
16. A fraction is one or more of the equal parts of a whole thing.

1. Read these fractions: $\frac{1}{2}$; $\frac{1}{4}$; $\frac{2}{4}$; $\frac{3}{4}$.

2. Name two fractions, one of which is twice the other.

3. Name two fractions, one of which is three times the other.

4. How many cakes of paint in this box?



5. Susie gave away four of the cakes. How many had she left? What part of the whole number had she left?

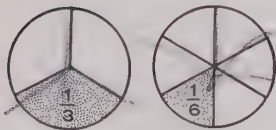
6. Two cakes are what part of 8 cakes? Six cakes are what part of 8 cakes?

Thirds and Sixths

17. Jennie drew two circles and shaded them as shown in the picture.

1. Point to the shaded part of the first circle.

One-third of anything is one of its three equal parts.



2. In the first circle, point to one-third that is not shaded.

3. Point to the shaded part of the second circle. How many parts in the whole circle?

One-sixth of anything is one of its six equal parts.

4. In the second circle, point to one-sixth that is not shaded.

5. How many sixths in the whole circle? How many sixths in one-third of it?

6. One-sixth is what part of one-third? Point to two-thirds of the first circle. How many sixths in two-thirds?

7. How many sixths in one-half of a circle?

8. Read these fractions: $\frac{1}{2}$; $\frac{1}{3}$; $\frac{1}{4}$; $\frac{1}{6}$; $\frac{2}{3}$; $\frac{2}{4}$; $\frac{3}{4}$; $\frac{3}{6}$; $\frac{4}{6}$; $\frac{5}{6}$.

ORAL EXERCISES

1. How many sixes in 12? 6 is what part of 12?

2. How many fours in 16? 4 is what part of 16?

3. How many fives in 15? 5 is what part of 15?

4. $\frac{1}{2}$ of 4 = ()? 11. $\frac{1}{2}$ of 14 = ()? 18. $\frac{1}{3}$ of 18 = ()?

5. $\frac{1}{2}$ of 8 = ()? 12. $\frac{1}{2}$ of 2 = ()? 19. $\frac{1}{3}$ of 15 = ()?

6. $\frac{1}{2}$ of 12 = ()? 13. $\frac{1}{2}$ of 6 = ()? 20. $\frac{1}{4}$ of 16 = ()?

7. $\frac{1}{2}$ of 10 = ()? 14. $\frac{1}{3}$ of 6 = ()? 21. $\frac{1}{4}$ of 8 = ()?

8. $\frac{1}{2}$ of 16 = ()? 15. $\frac{1}{3}$ of 9 = ()? 22. $\frac{1}{4}$ of 12 = ()?

9. $\frac{1}{2}$ of 20 = ()? 16. $\frac{1}{3}$ of 3 = ()? 23. $\frac{1}{4}$ of 4 = ()?

10. $\frac{1}{2}$ of 18 = ()? 17. $\frac{1}{3}$ of 12 = ()? 24. $\frac{1}{4}$ of 12 = ()?

25. Mary had 4 pencils and used 2. What part of the whole number had she left?

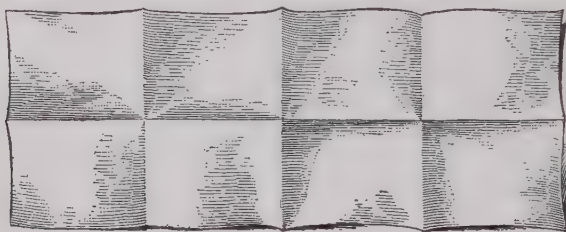
26. When she had used 1 of the 4 pencils, what part had she used? What part had she left?

27. John had 8 marbles and lost 4. What part did he lose? What part had he left?

28. Susie used 2 of her 6 cakes of paint. What part of the 6 cakes did she use?

29. Charles divided 10 oranges into two equal piles. How many were in each pile? 5 is what part of 10?

30. Fold a strip of paper 4 inches long and 2 inches wide, like the figure. Find $\frac{1}{4}$ of 8 squares.



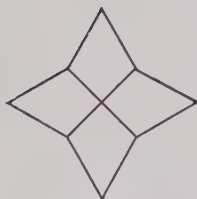
31. Find $\frac{1}{2}$ of 8 squares. $\frac{3}{4}$ of 8 squares.

32. Find $\frac{1}{3}$ of 6 squares. $\frac{2}{3}$ of 6 squares.

33. Find $\frac{1}{2}$ of 4 squares. $\frac{1}{2}$ of 8 squares.

WRITTEN EXERCISES

1. Draw a figure like this one and shade $\frac{1}{4}$ of it. Shade another fourth of it. What part of the whole is shaded?



2. Shade another fourth of it. What part of the whole is shaded?

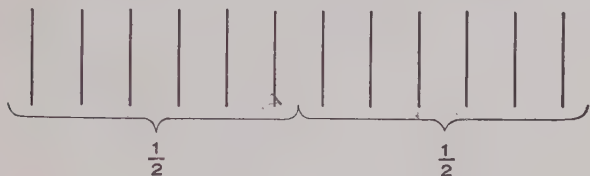
3. Draw a figure like this. Shade $\frac{1}{6}$ of it. Shade another sixth of it. What part of the whole figure is shaded?



4. Shade another sixth. How many sixths are shaded? What part of the whole figure is shaded?

5. Shade another sixth. What part of the whole figure is shaded? Shade another sixth and tell what part of the whole is shaded.

6. Make 12 straight lines like these. Count half of these and mark each half as in the picture.



7. Count one-third of the 12 lines. Then count another third. Then another. Mark off each third and write $\frac{1}{3}$ under it.

8. Count one-fourth of the 12 lines. Then another fourth, and so on until they are all counted. Write $\frac{1}{4}$ under each part.

9. Count one-sixth of the 12 lines, then another sixth, and so on, until they are all counted. Write $\frac{1}{6}$ under each part.

10. Show that $\frac{1}{2}$ of 12 lines is $\frac{2}{4}$ of 12 lines.

11. Show that $\frac{1}{3}$ of 12 lines is $\frac{2}{6}$ of 12 lines.

12. Show that $\frac{2}{3}$ of 12 lines is $\frac{4}{6}$ of 12 lines.

13. Draw 16 lines and show that $\frac{1}{2}$ of 16 lines is $\frac{2}{4}$ of 16 lines.

14. Draw 18 lines and show that $\frac{2}{3}$ of 18 lines is $\frac{4}{6}$ of 18 lines.

MEASUREMENT

Linear Measure

18. PREPARATORY.

1. Count the numbered spaces in the foot rule. What is each space called?



12 inches make 1 foot (12 in. = 1 ft.).

2. Place a foot rule on a yard stick, bringing one end of each together. Mark the yard stick at the other end of the foot rule.



3. Move the foot rule along a distance equal to its length and mark the yard stick as before. Move the rule along once more.

4. How many feet in a yard?

5. 1 foot is what part of a yard?

6. A 2-foot length is what part of a yard?

3 feet make 1 yard (3 ft. = 1 yd.).

ORAL EXERCISES

1. Show from the foot rule that 6 inches is $\frac{1}{2}$ of a foot.
2. Show from the foot rule that 4 inches is $\frac{1}{3}$ of a foot.
3. Show from the foot rule that 3 inches is $\frac{1}{4}$ of a foot.
4. Show from the foot rule that 9 inches is $\frac{3}{4}$ of a foot.
5. Carl has a piece of rope 1 ft. long. If he should cut from it a piece 3 in. long, how much would there be left in the first piece?
6. How many inches long altogether would pieces of ribbon $\frac{1}{2}$ ft., $\frac{1}{3}$ ft., and $\frac{1}{4}$ ft. be?
7. Mary has 4 yd. of ribbon. If she should divide it into two equal parts, how many feet long would each of those parts be?
8. A certain book is $\frac{3}{4}$ ft. long and $\frac{1}{2}$ ft. wide. How many inches long is it? How many inches wide?

United States Money

19. PREPARATORY.

1. How many cents are equal in value to a 5-cent piece (or a nickel)?
2. How many cents are equal in value to two 5-cent pieces?

3. How many cents in a dime? How many 5-cent pieces are equal in value to a dime?



4. A dime is worth how many cents more than a 5-cent piece?

5. A 5-cent piece is worth what part of a dime?

6. How many cents are equal in value to a 5-cent piece and 2 cents? To a 5-cent piece and 3 cents? To a 5-cent piece and 4 cents?

$$10 \text{ cents} = 1 \text{ dime.}$$

$$2 \text{ five-cent pieces} = 1 \text{ dime.}$$

5 cents may be written 5 cts. or 5¢.

ORAL EXERCISES

1. If you have a 5-cent piece and make a 3-cent purchase, how many cents have you left?

2. How many cents in 2 cts. and 2 cts. and 5 cts.?

3. How much more is a 5-cent piece worth than two 2-cent stamps?

4. What stamps can you buy with a 5-cent piece? Give another answer. Still another.

5. How many 5-cent stamps would a dime buy?

6. A 4-cent stamp is worth how much less than a dime?

7. A 5-cent stamp and two 2-cent stamps are together worth how much less than a dime?

8. How many single postal cards will a dime buy?

9. Mary has a dime, a nickel, and 2 cents. How much has she altogether?

10. If she should spend the nickel for a book, how much money would she have left?

11. I bought three 2-cent papers and gave the salesman a dime. How much change did I get?

12. If marbles cost 2 cts. apiece, how many could Harry buy with a dime?

13. If postage stamps are 2 cts. apiece, how many could Tom buy with 2 nickels and 1 dime?

Liquid Measure .

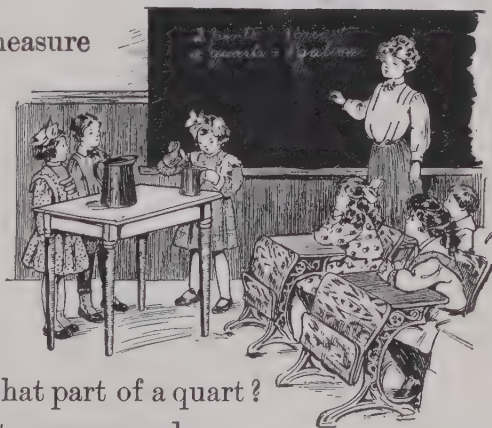
20. PREPARATORY.

1. Fill a pint measure with water and pour the pint of water into a quart measure. Repeat until the quart measure is full.

2. How many pints in a quart?

3. One pint is what part of a quart?

4. Fill the quart measure and pour its contents into the gallon measure. Repeat until the gallon measure is full.



5. How many quarts are there in a gallon?
6. How many pints are there in a gallon?

2 pints make 1 quart (2 pt. = 1 qt.).
4 quarts make 1 gallon (4 qt. = 1 gal.).

ORAL EXERCISES

1. A 2-quart bottle holds how many pints?
2. 2 qt. are what part of a gallon?
3. 3 qt. are what part of a gallon?
4. When milk is 5 cts. a quart, how many pints can you buy for 5 cts.? For 10 cts.?
5. What does a quart and a half of milk cost at 3 cts. a pint?
6. What does a gallon of milk cost at 5 cts. a quart?
7. When milk costs 8 cts. a quart, what does a pint cost? What does a quart and a half cost?
8. A milkman filled a quart bottle and 2 pint bottles from a gallon of milk. What part of a gallon had he left?
9. The cook used 3 pints out of 3 quarts of milk.

What part of the whole did she use?



10. How many pint bottles can be filled from a gallon of milk?
11. When pint tickets cost 3 cts. each, what is the cost of the tickets in the picture?

12. When milk is 10 cts. a quart, what is the cost of a pint ticket? Of 3 pint tickets?

13. When milk is 8 cts. a quart, what is the cost of 2 qts. and 1 pt. of milk?

14. 4 pint tickets are worth as much as how many quart tickets?

15. When milk is 3 cts. a pint, how many pint tickets can you buy for 18 cts.? How many quarts of milk will these tickets buy?

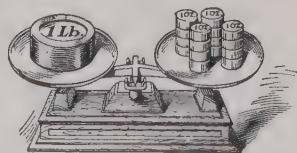
16. How many pint tickets are worth as much as 2 quart tickets and 3 pint tickets?

17. What does 1 qt. of milk cost at 4 cts. a pint? What do 2 qt. cost?

Measures of Weight.

21. PREPARATORY.

1. Wendell placed some weights on a balance and found that 16 ounces make 1 pound.



2. How many 4-ounce packages of spice can be made from a pound?

3. How many 8-ounce packages can be made from a pound of rice?

16 ounces make one pound (16 oz. = 1 lb.).

4. How many ounces in $\frac{1}{2}$ of a pound?

5. How many ounces in $\frac{1}{4}$ of a pound?

ORAL EXERCISES

1. Mary bought 8 oz. of one kind of seed and 8 oz. of another kind for her bird. How many pounds of seed did she buy?

2. How many pounds in two packages of spice, one of which contains 12 oz. and the other 4 oz.?

3. 3 cans of spice weigh 4 oz. each. What part of a pound do they weigh altogether?

4. Some cakes of soap weigh $\frac{1}{4}$ of a lb. each. How many cakes weigh 8 oz.? 12 oz.? 16 oz.? 20 oz.?

5. How many 4-ounce packages can be made from $\frac{1}{2}$ of a lb. of rice?

6. 4 oz. is what part of a pound? How many ounces is $\frac{3}{4}$ of a lb.?

7. 20 oz. is 1 lb. and what part of a pound?

8. At 2 cts. an ounce, what does $\frac{1}{2}$ of a lb. of cake cost?

9. At 3 cts. an ounce, what does $\frac{1}{4}$ of a lb. of candy cost?

10. A book weighs $\frac{1}{2}$ of a lb. and a tablet $\frac{1}{4}$ of a lb. How many ounces does each weigh? How many ounces do they weigh together?

11. Out of a pound of sugar, 8 ounces were used. How many ounces were left? What part of a pound was left?

12. $\frac{1}{4}$ lb. = () oz.? $\frac{1}{2}$ lb. = () oz.?

13. $\frac{3}{4}$ lb. = () oz.? 1 lb. and $\frac{1}{4}$ lb. = () oz.?

REVIEW AND PRACTICE

1. Jane bought 3 yd. of calico at 5 cts. a yard. How much change did she receive from 2 dimes?

2. 6 in. are what part of a foot?

3. How many feet in $\frac{1}{3}$ of a yd.?

4. What is the distance around a square 3 in. on a side?

5. How many 2-cent pencils will a dime buy?

6. Harry brought 2 gal. of water in two pails; in the small pail he had 2 qt.; the rest in the larger one. How many pints were there in the larger pail?

7. The grocer had an order for $1\frac{1}{4}$ lb. of tea. How many ounces were wanted?

8. Mary bought 3 oz. pepper, 1 oz. ginger, $\frac{1}{4}$ lb. mustard. How many ounces altogether were bought? What part of a pound?

9. How many nickels would it take to pay for 10 pencils at 2 cts. each?

10. Mark had 18 books; he gave $\frac{1}{6}$ of them to his cousin. How many had he left?

11. What part of 1 lb. are 4 oz.?

12. From 1 yd. of ribbon, I cut 2 ft. How many inches had I left?

13. $\frac{1}{4}$ of 2 dimes is equal to how many nickels?

14. $\frac{1}{3}$ of my apples is 5. How many apples have I?

15. Susie bought $\frac{1}{2}$ lb. of ginger. How many ounces did she buy?

16. I bought 1 ft. and 6 in. of ribbon. How many inches altogether did I buy?

17. From 2 gal. of milk, 6 pt. were sold. How many pints were left?

18. How many inches are 7 in. and $\frac{1}{3}$ ft.?

19. I bought 1 lb. of candy and gave Mary 6 oz. of it. How many ounces had I left?

20. How many dimes would it take to pay for 4 apples at 5 cts. each?

21. John had 18 marbles and gave $\frac{1}{3}$ of them to his brother. How many did the brother get?

22. 2 cents, 1 nickel, and 1 dime are how many cents?

23. I bought a piece of oilcloth 19 in. long. How many feet and how many inches besides did I buy?

24. The grocer sold $1\frac{1}{2}$ gal. of molasses. How many pints did he sell?

25. From 19 oz. of sugar, how much would be left after selling 1 lb.?

26. A grocer sold 4 pt. of milk from a full gallon measure. How many pints were left?

27. Mary bought $\frac{1}{2}$ lb. of crackers for 8 cts. How much did they cost her per ounce?

28. How many pint measures could be filled from $\frac{1}{2}$ gal. of water?

29. $\frac{1}{4}$ of my money is 5 cts. How many cents have I in all?

GENERAL REVIEW

ORAL EXERCISES

Read, and supply the missing numbers:

1. $9 + 3 = (\quad)$.

9. $7 + 6 = (\quad)$.

2. $9 + 7 = (\quad)$.

10. $9 + 5 = (\quad)$.

3. $7 + 8 = (\quad)$.

11. $5 + 8 = (\quad)$.

4. $13 + 5 = (\quad)$.

12. $17 + 3 = (\quad)$.

5. $11 + 4 = (\quad)$.

13. $10 + 6 = (\quad)$.

6. 4 and () are 11.

14. () and 7 are 13.

7. 6 and () are 11.

15. () and 9 are 16.

8. 8 and () are 12.

16. () and 14 are 19.

Add:

17.	1	2	3	4	3	5	3	6	4	4
	3	4	5	0	3	4	6	2	3	3
	5	2	1	5	3	1	2	3	5	2
	1	2	1	1	1	5	4	2	1	3

18.	1	7	4	3	7	5	2	8	1	4
	1	7	4	6	5	3	1	1	4	4
	5	1	4	7	3	2	7	3	0	5
	2	1	5	2	5	4	0	2	6	2
	2	3	1	2	0	6	3	4	2	1

Name the number that, added to the smaller number, makes the larger :

19.	10	16	19	10	11	14	18	15	11	17
	<u>6</u>	<u>5</u>	<u>4</u>	<u>3</u>	<u>2</u>	<u>8</u>	<u>9</u>	<u>7</u>	<u>8</u>	<u>6</u>

20.	19	12	18	19	20	12	19	20	16	14
	<u>4</u>	<u>5</u>	<u>7</u>	<u>3</u>	<u>6</u>	<u>8</u>	<u>9</u>	<u>10</u>	<u>10</u>	<u>11</u>

Read, and supply the missing numbers :

- | | |
|---------------------------|--|
| 21. 2 times 6 are (). | 43. $\frac{1}{6}$ of 6 is (). |
| 22. 3 times 6 are (). | 44. 7 are $\frac{1}{2}$ of (). |
| 23. 4 times () are 12. | 45. 3 are $\frac{1}{3}$ of (). |
| 24. 5 times () are 15. | 46. 4 are $\frac{1}{4}$ of (). |
| 25. 6 times () are 12. | 47. 2 are $\frac{1}{3}$ of (). |
| 26. 3 times 3 are (). | 48. $\frac{1}{4}$ of 8 is (). |
| 27. 2 times 7 are (). | 49. $\frac{1}{6}$ of 12 is (). |
| 28. 3 times 6 are (). | 50. $\frac{2}{3}$ of 18 is (). |
| 29. () times 2 are 14. | 51. 1 ft. is () in. |
| 30. () times 6 are 18. | 52. $\frac{1}{3}$ ft. is () in. |
| 31. 5 times 4 are (). | 53. 3 in. are () ft. |
| 32. 8 times () are 16. | 54. 1 gal. is () qt. |
| 33. 9 times () are 18. | 55. 1 qt. is () gal. |
| 34. 4 twos = () fours. | 56. 16 oz. are 1 (). |
| 35. 3 twos = () sixes. | 57. 4 oz. are () lb. |
| 36. 4 threes = () twos. | 58. 1 nickel = () cts. |
| 37. 5 twos = 1 (). | 59. 1 nickel = () dimes. |
| 38. 6 threes = () twos. | 60. $\frac{1}{2}$ ft. is () in. |
| 39. 4 threes = () sixes. | 61. 1 pt. is () qt. |
| 40. 12 = () twos. | 62. 8 oz. are () lb. |
| 41. 15 = () threes. | 63. 4 dimes = () cts. |
| 42. 9 times 2 are (). | 64. $\frac{3}{4}$ of a foot is () in. |

Solve:

65. What is the sum of the sides of a triangle if each side is 5 in. long? If each side is 6 in. long?

66. How many sides have 3 squares? 4 squares?

67. How many triangles 3 in. on each side can be made from a stick 18 in. long?

68. If 1 in. in a drawing stands for 1 ft. in the object, how long is a line which stands for 4 yd. ?

69. At 2 for a cent, how many marbles can you buy for 4 cts.? For 7 cts.? For 8 cts.?

70. What is the cost of 2 qt. of milk at 3 cts. a pint? Of 3 qt.?

71. At 6 cts. a quart, how much would $\frac{1}{2}$ of a gal. cost?

72. Mary bought $\frac{1}{2}$ lb. of tea and $\frac{1}{4}$ lb. of sugar. How many ounces in all did she buy?

73. Tom had 14 cts.; Mary had $\frac{1}{2}$ as much as Tom. How much had Mary?

74. How many pieces 9 in. long can be cut from a strip of paper $1\frac{1}{2}$ ft. long?

75. Susie had a box of 16 blocks; the first week she lost 7, the next week 5. How many had she left?

76. How many feet and how many inches besides are there around a square 5 in. on a side?

77. How many sticks are needed to build 2 triangles? 3 squares? 3 triangles and 2 squares?

78. How many inches around a triangle 3 in. on a side? Around a square 3 in. on a side?

79. Henry bought two 2-cent stamps and 3 postal cards. How much change did he get from a dime?

80. John had 8 qt. of milk to deliver. How many gallons did he have? How many pints?

81. If he sold $\frac{1}{2}$ of it, how many pints would he have left?

82. Mary bought 12 oz. of candy. What part of a pound did she buy?

WRITTEN EXERCISES

Copy and add:

1. 11	4. 8	7. 9	10. 8	13. 9
9	9	9	11	7
<hr/>	<hr/>	<hr/>	<hr/>	<hr/>

2. 10	5. 7	8. 8	11. 12	14. 6
8	8	8	7	9
<hr/>	<hr/>	<hr/>	<hr/>	<hr/>

3. 9	6. 11	9. 13	12. 12	15. 7
6	7	7	8	6
<hr/>	<hr/>	<hr/>	<hr/>	<hr/>

Copy and subtract:

16. 20	19. 17	22. 15	25. 16	28. 18
8	8	8	8	12
<hr/>	<hr/>	<hr/>	<hr/>	<hr/>

17. 19	20. 15	23. 18	26. 15	29. 17
9	7	9	9	9
<hr/>	<hr/>	<hr/>	<hr/>	<hr/>

18. 11	21. 10	24. 10	27. 7	30. 6
6	5	9	7	6
<hr/>	<hr/>	<hr/>	<hr/>	<hr/>

Copy and multiply :

31. $\begin{array}{r} 5 \\ 4 \\ \hline \end{array}$	33. $\begin{array}{r} 6 \\ 3 \\ \hline \end{array}$	35. $\begin{array}{r} 7 \\ 2 \\ \hline \end{array}$	37. $\begin{array}{r} 8 \\ 2 \\ \hline \end{array}$	39. $\begin{array}{r} 5 \\ 3 \\ \hline \end{array}$	41. $\begin{array}{r} 9 \\ 2 \\ \hline \end{array}$	43. $\begin{array}{r} 4 \\ 5 \\ \hline \end{array}$
32. $\begin{array}{r} 2 \\ 6 \\ \hline \end{array}$	34. $\begin{array}{r} 6 \\ 2 \\ \hline \end{array}$	36. $\begin{array}{r} 2 \\ 9 \\ \hline \end{array}$	38. $\begin{array}{r} 2 \\ 8 \\ \hline \end{array}$	40. $\begin{array}{r} 2 \\ 7 \\ \hline \end{array}$	42. $\begin{array}{r} 3 \\ 6 \\ \hline \end{array}$	44. $\begin{array}{r} 10 \\ 2 \\ \hline \end{array}$

Copy and divide :

45. $2\overline{)18}$	48. $4\overline{)16}$	51. $3\overline{)12}$	54. $5\overline{)15}$	57. $6\overline{)18}$
46. $3\overline{)18}$	49. $5\overline{)20}$	52. $2\overline{)10}$	55. $4\overline{)20}$	58. $3\overline{)15}$
47. $2\overline{)14}$	50. $7\overline{)14}$	53. $5\overline{)10}$	56. $2\overline{)20}$	59. $2\overline{)16}$

Write these numbers in figures :

60. II	62. VI	64. III	66. IIII	68. XI	70. I
61. IV	63. VII	65. X	67. IX	69. V	71. XII

Write problems from these statements and write the answer to each :

72. A half pound of tacks costs 5 cts.
73. Martha bought 3 yd. of calico at 4 cts. a yard.
74. William spent 18 cts. for oranges at 3 cts. each.
75. Rubber balls cost 4 cts. each, and tops 5 cts.
76. 8 oz. of coffee cost 15 cts.
77. Gasoline costs 20 cts. a gallon.
78. Writing tablets cost 6 cts. each.
79. Apples are sold 2 for 5 cts.
80. Peanuts cost 10 cts. a pint.

CHAPTER II

NOTATION AND NUMERATION

Tens

22. PREPARATORY.

1. How many tens in twenty?
2. How many tens in thirty?

One ten is written in figures **10** and called *ten*.

Two tens are written **20** and called *twenty*.

Threetens are written **30** and called *thirty*.

Four tens are written **40** and called *forty*.

Five tens are written **50** and called *fifty*.

Six tens are written **60** and called *sixty*.

Seven tens are written **70** and called *seventy*.

Eight tens are written **80** and called *eighty*.

Nine tens are written **90** and called *ninety*.

Ten tens are written **100** and called *one hundred*.

ORAL EXERCISES

1. Count by tens from 10 to 100.

2. Read :

30 50 40 70 60 90 80

3. What are 5 tens called ? 3 tens ? 7 tens ? 2 tens ?
10 tens ?

4. How many tens are there in sixty ? In ninety ?

5. How many sides has Figure 1? Figure 2? Figure 3? Figure 4?



FIG. 1.



FIG. 2.



FIG. 3.



FIG. 4.

6. Suppose each side of each of these figures to be 10 in. Then what is the distance around the triangle? Around the square? Around Figure 3? Figure 4?

7. How many are 4 times 10? 5 times 10? 3 times 10? 6 times 10? 8 times 10?



8. If the top line stands for 10 tens, or 100, what number does the next line stand for? The next? The third? The fourth? The fifth? The sixth?

9. 5 tens and 3 tens are how many tens? 50 and 30 make what number?

10. 7 tens and 2 tens are how many tens? 70 and 20 make what number?

WRITTEN EXERCISES

1. Write the names of:

70 60 40 50 30 20 100

Write in figures:

- | | | |
|-----------|----------------|-----------|
| 2. Ninety | 5. Seventy | 8. Sixty |
| 3. Fifty | 6. Thirty | 9. Eighty |
| 4. Twenty | 7. One hundred | 10. Forty |
11. The sum of thirty and twenty. Of 40 and 50.
12. The product of two times twenty.

Units and Tens

23. PREPARATORY.

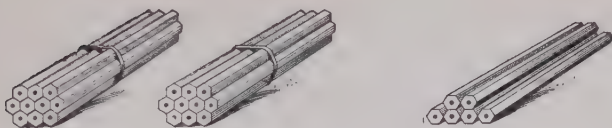
- How many books are 10 books and 1 book?
- Eleven are how many more than ten?
- How many tens and how many ones together make eleven?



- How many flags are ten flags and two flags?
- Twelve are how many more than ten?
- How many tens and how many ones together make twelve?



- Ten houses and three houses are how many houses?
- Thirteen are how many more than ten?
- How many tens and how many ones together make thirteen?



10. Ten pencils and ten pencils and six pencils are how many pencils?

11. How many tens are there in twenty-six?

ORAL EXERCISES

1. How many ones in 2 tens? In 6 tens? In 7 tens? In 8 tens?

2. How many are one ten and 3 ones? 2 tens and 3 ones? 3 tens and 7 ones? 5 tens and 10 ones?

3. Count from 20 to 30. From 60 to 70. From 75 to 85.

4. I have 5 ones. How many tens do I need to make 15 ones? To make 25 ones?

5. How many tens and how many ones are there in 55? In 77? In 88? In 99?

6. Fourteen are how many more than 1 ten? What number is 4 more than 2 tens?

Place Value

24. PREPARATORY.

1. In 11, which figure shows the number of tens? What does the other figure show?

2. Answer the same questions for 12. For 17. For 10. For 20.

3. 25 are how many tens and how many ones besides? Which figure shows the number of tens? Does this stand at the right or at the left of the other figure?

25. A single thing of any kind is a **unit**. The number 1 expresses a unit. The number 5 stands for 5 ones, or 5 units.

TENS UNITS

1 and 0 = 10

1 " 2 = 12

2 " 1 = 21

3 " 3 = 33

4 " 5 = 45

5 " 7 = 57

6 " 9 = 69

7 " 8 = 78

8 " 4 = 84

9 " 6 = 96

1. Look at the table. How many tens and how many units are expressed by the number 10?

2. In these numbers, which line of figures, the right or the left, shows the number of units?

26. In all whole numbers the figure at the right expresses units.

The next figure at the left expresses tens. The place at the right, in which the number of units is written, is called **units' place**. The next place at the left, in which the number of tens is written, is called **tens' place**.

ORAL EXERCISES

1. 4 in units' place means how many?

2. 4 in tens' place means how many? In writing 4 tens, what figure do you use in units' place?

3. How many dimes are there in 75 cents, and how many cents besides?

4. In 75 cents, which figure shows the number of dimes? Which shows the number of cents besides?

WRITTEN EXERCISES

Write in figures the number expressed by :

1. 6 in tens' place.
2. 3 in units' place and 7 in tens' place.
3. 9 in tens' place and 1 in units' place.
4. 3 in units' place and 1 in tens' place.

Write in figures the number that is :

- | | |
|------------------------|---------------------------------|
| 5. 2 tens and 7 ones. | 11. One more than ten. |
| 6. 1 ten and 2 ones. | 12. Five tens and one. |
| 7. 4 times 10. | 13. Seven times ten and two. |
| 8. 6 tens and 6 ones. | 14. Nine more than ten. |
| 9. 9 tens and 8 ones. | 15. Eight more than eight tens. |
| 10. 8 times 10, and 1. | 16. Four tens and ten ones. |

Roman Notation

27. PREPARATORY.

1. Write, as they usually appear on the clock face, the numbers used to mark the hours.
2. Write each of these numbers in figures.
3. How many different letters are used in the Roman numbers on the clock face? What are they?

28. This way of writing numbers was used by the Romans ; hence it is called **Roman notation**.

The figures we commonly use were invented by the Hindus and later used by the Arabs, who introduced them into Europe. This is why they are called Hindu or Arabic numerals.

ORAL EXERCISES

Read each line across the page :

ARABIC	ROMAN
1	I
$1 + 1 = 2$	$I + I = II$
$1 + 1 + 1 = 3$	$I + I + I = III$
1 from 5 = 4	I from V = IV
5	V
$5 + 1 = 6$	$V + I = VI$
$5 + 2 = 7$	$V + II = VII$
$5 + 3 = 8$	$V + III = VIII$
1 from 10 = 9	I from X = IX
10	X
$10 + 1 = 11$	$X + I = XI$
$10 + 2 = 12$	$X + II = XII$
$10 + 3 = 13$	$X + III = XIII$
$10 + 4 = 14$	$X + IV = XIV$
$10 + 5 = 15$	$X + V = XV$
$10 + 6 = 16$	$X + VI = XVI$
$10 + 7 = 17$	$X + VII = XVII$
$10 + 8 = 18$	$X + VIII = XVIII$
$10 + 9 = 19$	$X + IX = XIX$
$10 + 10 = 20$	$X + X = XX$

29. Fifty is written L.

Forty, or 10 less than 50, is written XL.

WRITTEN EXERCISES

1. Build a table similar to the one above, for the Roman numbers from 20 to 30. From 40 to 50.

Write in Roman notation :

- | | | | | | |
|--------|--------|--------|--------|---------|---------|
| 2. 11. | 4. 19. | 6. 49. | 8. 50. | 10. 33. | 12. 18. |
| 3. 16. | 5. 24. | 7. 30. | 9. 25. | 11. 44. | 13. 40. |

ADDITION

Use of Tables Extended

THE ADDITION OF A ONE-FIGURE NUMBER TO TENS.

30. Just as $10 + 1 = 11$, so $20 + 1 = 21$, $30 + 1 = 31$, and so on.

Just as $10 + 3 = 13$, so $20 + 3 = 23$, $30 + 3 = 33$, and so on.

ORAL EXERCISES

Read, and give the sum in each case:

1. $10 + 1 = (\quad)$. $20 + 1 = (\quad)$. $30 + 1 = (\quad)$.
 2. $10 + 9 = (\quad)$. $20 + 9 = (\quad)$. $30 + 9 = (\quad)$.
 3. $10 + 5 = (\quad)$. $30 + 5 = (\quad)$. $50 + 5 = (\quad)$.
 4. $10 + 7 = (\quad)$. $90 + 7 = (\quad)$. $60 + 7 = (\quad)$.
- | | | | | | | | |
|----------|----------|----------|----------|----------|----------|----------|----------|
| 5. 40 | 20 | 30 | 60 | 50 | 70 | 90 | 80 |
| <u>9</u> | <u>6</u> | <u>7</u> | <u>8</u> | <u>2</u> | <u>4</u> | <u>3</u> | <u>5</u> |
- | | | | | | | | |
|----------|----------|----------|----------|----------|----------|----------|----------|
| 6. 20 | 40 | 90 | 60 | 80 | 70 | 50 | 30 |
| <u>8</u> | <u>7</u> | <u>9</u> | <u>5</u> | <u>4</u> | <u>6</u> | <u>7</u> | <u>3</u> |

THE ADDITION OF A ONE-FIGURE NUMBER TO A TWO-FIGURE NUMBER WHEN THE SUM OF THE UNITS IS LESS THAN 10.

31. Just as $11 + 7 = 18$, so $21 + 7 = 28$, $31 + 7 = 38$, and so on.

Just as $15 + 4 = 19$, so $25 + 4 = 29$, $55 + 4 = 59$, and so on.

ORAL EXERCISES

Read, and give the sum in each case :

1. $18 + 1 = (\quad)$. $28 + 1 = (\quad)$. $38 + 1 = (\quad)$.

2. $13 + 5 = (\quad)$. $23 + 5 = (\quad)$. $53 + 5 = (\quad)$.

3. $11 + 7 = (\quad)$. $41 + 7 = (\quad)$. $61 + 7 = (\quad)$.

4. $14 + 3 = (\quad)$. $34 + 3 = (\quad)$. $54 + 3 = (\quad)$.

5. 42	6. 74	7. 33	8. 57	9. 21	10. 38
<u> 3 </u>	<u> 5 </u>	<u> 4 </u>	<u> 2 </u>	<u> 7 </u>	<u> 1 </u>

Column Addition with Two-figure Numbers

WHEN THE SUM IN EACH COLUMN IS LESS THAN 10.

32. EXAMPLE: Add 46 and 22.

46 = 4 tens and 6 units	46
22 = 2 tens and 2 units	<u>22</u>
6 tens and 8 units	68

ORAL EXERCISES

Add by columns of units and tens :

1. 17	4. 12	7. 73	10. 42	13. 36	16. 51
<u>21</u>	<u>14</u>	<u>11</u>	<u>13</u>	<u>23</u>	<u>20</u>

2. 70	5. 14	8. 25	11. 19	14. 13	17. 11
<u>10</u>	<u>22</u>	<u>41</u>	<u>20</u>	<u>50</u>	<u>70</u>
<u>17</u>	<u>31</u>	<u>12</u>	<u>60</u>	<u>5</u>	<u>8</u>

3. 16	6. 33	9. 80	12. 21	15. 6	18. 20
<u>40</u>	<u>4</u>	<u>10</u>	<u>31</u>	<u>51</u>	<u>50</u>
<u>12</u>	<u>30</u>	<u>7</u>	<u>41</u>	<u>30</u>	<u>10</u>

WRITTEN EXERCISES

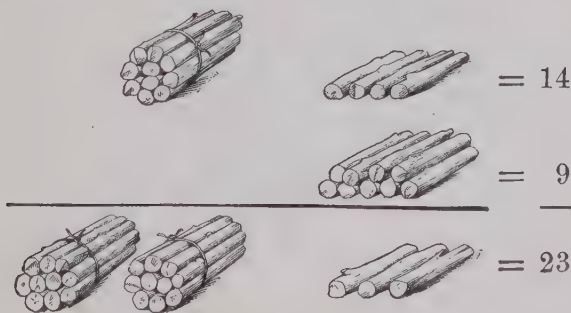
Write the numbers of each example in a column, and add:

1. $15 + 10 + 30 + 12.$
2. $25 + 34 + 20 + 20.$
3. $77 + 2 + 10 + 0.$
4. $60 + 4 + 14 + 1.$
5. $7 + 40 + 2 + 10 + 20.$
6. $12 + 5 + 11 + 30 + 1.$
7. $8 + 10 + 70 + 0 + 10.$
8. $24 + 32 + 30 + 13 + 1.$

WHEN THE SUM IN UNITS' COLUMN IS GREATER THAN 10.

33. EXAMPLE: Add 14 and 9.

How many sticks are there in the upper group? In the middle group? In the lower group?



$$14 = 1 \text{ ten and } 4 \text{ units}$$

$$9 = \quad \quad 9 \text{ units}$$

$$1 \text{ ten and } 13 \text{ units} = 2 \text{ tens } 3 \text{ units} = 23$$

WRITTEN EXERCISES

Copy and add:

1. $\begin{array}{r} 14 \\ 8 \\ \hline \end{array}$
2. $\begin{array}{r} 66 \\ 7 \\ \hline \end{array}$
3. $\begin{array}{r} 44 \\ 6 \\ \hline \end{array}$
4. $\begin{array}{r} 15 \\ 8 \\ \hline \end{array}$
5. $\begin{array}{r} 67 \\ 7 \\ \hline \end{array}$
6. $\begin{array}{r} 56 \\ 5 \\ \hline \end{array}$

7. 23 7 —	10. 55 8 —	13. 66 6 —	16. 25 8 —	19. 83 9 —	22. 84 6 —
8. 44 9 —	11. 29 5 —	14. 77 7 —	17. 65 8 —	20. 46 7 —	23. 73 8 —
9. 27 7 —	12. 28 3 —	15. 82 9 —	18. 75 8 —	21. 49 9 —	24. 77 9 —

34. EXAMPLE: Add 46 and 29.

$$\begin{array}{r}
 46 = 4 \text{ tens and } 6 \text{ units} \quad 46 \\
 29 = 2 \text{ tens and } 9 \text{ units} \quad 29 \\
 \hline
 6 \text{ tens and } 15 \text{ units} \\
 \text{or, } 7 \text{ tens and } 5 \text{ units} \quad 75
 \end{array}$$

In adding the units we think 9 and 6 are 15; that is, 1 ten and 5 units. We write the 5 and add the 1 ten to the next column, thinking 1 ten and 2 tens and 4 tens are 7 tens; and write 7.

WRITTEN EXERCISES

Copy and add:

1. 45 19 —	5. 37 54 —	9. 36 43 —	13. 37 26 —	17. 25 67 —	21. 67 24 —
2. 36 27 —	6. 43 47 —	10. 58 39 —	14. 29 34 —	18. 33 28 —	22. 26 14 —
3. 49 22 —	7. 77 22 —	11. 16 38 —	15. 47 18 —	19. 44 39 —	23. 36 24 —
4. 23 49 —	8. 36 38 —	12. 22 78 —	16. 46 34 —	20. 55 35 —	24. 79 19 —

Solve :

25. There are 28 telephone-poles on one side of the street and 23 on the other. How many are there on both sides?

26. There are 64 telephone-wires on a pole and 17 telegraph-wires. How many wires on the pole?

27. Laura picked 15 poppies and Florence picked 29. How many did they both pick?

28. A farmer sold one day 32 qt. of berries in the market and 19 qt. to other customers. How many quarts did he sell?

29. Ted weighs 68 lb., and his brother weighs 13 lb. more. How much does his brother weigh?

30. Grace spent a dime and a nickel for a blank book, and 2 dimes, a nickel, and 3 pennies for a pencil box. How much did both cost her?

31. George and Frank went nutting; George gathered 19 qt., and Frank 31 qt. How many quarts did they both gather?

35. EXAMPLE: Add 25, 19, and 37.

	TENS	UNITS	
25	= 2	5	25
19	= 1	9	19
37	= 3	7	37
<hr/>			<hr/>
	8	1	81

In adding the units, do not say to yourself, "7 and 9 are 16, and 5 are 21," but think quickly "7, 16, 21," and write 1.

In adding the tens, think "2, 5, 6, 8," and write 8.

WRITTEN EXERCISES

Copy and add:

1. 34	3. 11	5. 29	7. 63	9. 16	11. 27
22	60	55	9	21	29
<u>19</u>	<u>29</u>	<u>13</u>	<u>27</u>	<u>28</u>	<u>12</u>
2. 19	4. 38	6. 13	8. 15	10. 32	12. 31
17	23	5	18	23	37
26	19	40	11	5	8
11	6	9	14	6	14
<u>22</u>	<u>8</u>	<u>21</u>	<u>17</u>	<u>10</u>	<u>6</u>

Write in columns the numbers in each exercise, and add:

13. $8 + 4 + 9 + 3 + 7.$

14. $11 + 3 + 15 + 2 + 8.$

15. $6 + 10 + 5 + 12 + 20.$

16. $17 + 30 + 4 + 18 + 9.$

17. $25 + 5 + 15 + 20 + 25.$

18. $13 + 3 + 23 + 33 + 10.$

19. $4 + 24 + 14 + 20 + 8.$

20. $19 + 3 + 26 + 33 + 16.$

Solve:

21. A fireman climbed 28 ft. to a third-story window, then 12 ft. higher to a fourth-story window, then 12 ft. higher to a fifth-story window. How many feet high was he then?

22. The distance between two telegraph-poles is 46 yd. How many yards of wire in two lines between them?

23. A fork 5 ft. long standing straight up on a load of hay 14 ft. above the ground, just reaches a telephone-wire. How high above the street is the wire?

24. If there are 36 roses in one vase, 18 roses in another, and 24 in another, how many roses are there in all?

25. Clarence wrote 56 words of his lesson on one page and 39 words on another. How many words did he write?

26. During a storm 17 of the trees in a street are blown down, and 23 are left standing. How many trees stood there before the storm?

27. I read 24 pages of my book yesterday, and 16 pages this morning; I have 48 still to read. How many pages are there in my book?

28. Kate has saved 4 dimes and 4 nickels; Fred has saved 1 dime and 2 nickels; and Jack has saved 3 nickels. How much money have they altogether?

29. Mary and John have a picture postal album. They have in it 6 postal cards from England, 12 from Germany, 10 from Canada, 4 from Florida, and 23 from other places. How many postal cards are in the album?

30. The pupils in a grade were divided into three classes. The A class contained 17 pupils, the B class 48 pupils, and the C class 13. How many pupils were there in the three classes?

31. Robert needs 18 ft. of wire netting for his row of sweet peas, 14 ft. for a bed of pinks, and 4 ft. for a honeysuckle vine. How many feet of netting must he get?

SUBTRACTION

Use of Tables Extended

THE SUBTRACTION OF A ONE-FIGURE NUMBER FROM A TEN.

36. Just as $10 - 1 = 9$, so $20 - 1 = 19$, $30 - 1 = 29$, and so on.

Just as $10 - 3 = 7$, so $20 - 3 = 17$, $30 - 3 = 27$, and so on.

ORAL EXERCISES

State the difference in each case:

1. $10 - 2 = (\quad)$. $20 - 2 = (\quad)$. $30 - 2 = (\quad)$.

2. $10 - 5 = (\quad)$. $20 - 5 = (\quad)$. $30 - 5 = (\quad)$.

3. $10 - 6 = (\quad)$. $30 - 6 = (\quad)$. $60 - 6 = (\quad)$.

4. $10 - 1 = (\quad)$. $40 - 1 = (\quad)$. $70 - 1 = (\quad)$.

5.	10	40	70	7.	10	50	90
	$\begin{array}{r} 10 \\ - 8 \\ \hline \end{array}$	$\begin{array}{r} 40 \\ - 8 \\ \hline \end{array}$	$\begin{array}{r} 70 \\ - 8 \\ \hline \end{array}$		$\begin{array}{r} 10 \\ - 9 \\ \hline \end{array}$	$\begin{array}{r} 50 \\ - 9 \\ \hline \end{array}$	$\begin{array}{r} 90 \\ - 9 \\ \hline \end{array}$

6.	10	30	60	8.	10	30	50
	$\begin{array}{r} 10 \\ - 7 \\ \hline \end{array}$	$\begin{array}{r} 30 \\ - 7 \\ \hline \end{array}$	$\begin{array}{r} 60 \\ - 7 \\ \hline \end{array}$		$\begin{array}{r} 10 \\ - 2 \\ \hline \end{array}$	$\begin{array}{r} 30 \\ - 2 \\ \hline \end{array}$	$\begin{array}{r} 50 \\ - 2 \\ \hline \end{array}$

THE SUBTRACTION OF A ONE-FIGURE NUMBER FROM A TWO-FIGURE NUMBER WHEN THE UNITS CAN BE SUBTRACTED.

37. Just as $12 - 1 = 11$, so $22 - 1 = 21$, $32 - 1 = 31$, and so on.

Just as $15 - 3 = 12$, so $25 - 3 = 22$, $35 - 3 = 32$, and so on.

ORAL EXERCISES

State the differences:

1. $14 - 3 = (\quad)$. $24 - 3 = (\quad)$. $34 - 3 = (\quad)$.

2. $16 - 4 = (\quad)$. $26 - 4 = (\quad)$. $36 - 4 = (\quad)$.

3. $17 - 5 = (\quad)$. $37 - 5 = (\quad)$. $67 - 5 = (\quad)$.

4. $19 - 9 = (\quad)$. $49 - 9 = (\quad)$. $79 - 9 = (\quad)$.

5.	18	68	98	8.	19	39	79
	$\begin{array}{r} 18 \\ - 5 \\ \hline \end{array}$	$\begin{array}{r} 68 \\ - 5 \\ \hline \end{array}$	$\begin{array}{r} 98 \\ - 5 \\ \hline \end{array}$		$\begin{array}{r} 19 \\ - 7 \\ \hline \end{array}$	$\begin{array}{r} 39 \\ - 7 \\ \hline \end{array}$	$\begin{array}{r} 79 \\ - 7 \\ \hline \end{array}$

6.	17	27	67	9.	18	58	98
	$\begin{array}{r} 17 \\ - 4 \\ \hline \end{array}$	$\begin{array}{r} 27 \\ - 4 \\ \hline \end{array}$	$\begin{array}{r} 67 \\ - 4 \\ \hline \end{array}$		$\begin{array}{r} 18 \\ - 6 \\ \hline \end{array}$	$\begin{array}{r} 58 \\ - 6 \\ \hline \end{array}$	$\begin{array}{r} 98 \\ - 6 \\ \hline \end{array}$

7.	18	48	88	10.	15	45	85
	$\begin{array}{r} 18 \\ - 8 \\ \hline \end{array}$	$\begin{array}{r} 48 \\ - 8 \\ \hline \end{array}$	$\begin{array}{r} 88 \\ - 8 \\ \hline \end{array}$		$\begin{array}{r} 15 \\ - 2 \\ \hline \end{array}$	$\begin{array}{r} 45 \\ - 2 \\ \hline \end{array}$	$\begin{array}{r} 85 \\ - 2 \\ \hline \end{array}$

Column Subtraction with Two-figure Numbers

WHEN THE UPPER NUMBER IN EACH COLUMN IS LARGER THAN THE LOWER NUMBER.

38. EXAMPLE: A man has a farm of 78 acres and sells 32 acres. How many acres has he left?

Take 32 from 78.

78 = 7 tens and 8 units	78
32 = 3 tens and 2 units	32
$\begin{array}{r} 78 \\ - 32 \\ \hline 46 \end{array}$	$\begin{array}{r} 78 \\ - 32 \\ \hline 46 \end{array}$

2 units taken from 8 units leave 6 units; 3 tens taken from 7 tens leave 4 tens. Or, we may think "2 units and 6 units are 8 units" and write 6 in units' place; "3 tens and 4 tens are 7 tens" and write 4 in tens' place.

Test: $46 + 32 = 78$.

The man has 46 acres left.

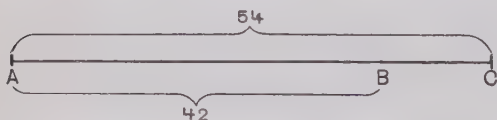
WRITTEN EXERCISES

Subtract, and test by addition :

1. 49 <u>29</u>	5. 49 <u>38</u>	9. 68 <u>18</u>	13. 45 <u>25</u>	17. 87 <u>31</u>	21. 34 <u>30</u>
2. 66 <u>44</u>	6. 77 <u>33</u>	10. 97 <u>35</u>	14. 58 <u>46</u>	18. 68 <u>13</u>	22. 45 <u>34</u>
3. 79 <u>39</u>	7. 44 <u>33</u>	11. 29 <u>15</u>	15. 76 <u>24</u>	19. 77 <u>15</u>	23. 26 <u>21</u>
4. 27 <u>12</u>	8. 66 <u>13</u>	12. 88 <u>47</u>	16. 64 <u>11</u>	20. 98 <u>28</u>	24. 69 <u>41</u>

Solve :

25. A lawn is 22 yd. wide and 33 yd. long. How many yards difference is there between its length and its width?



26. From city A to city B is 42 miles; from

A to C is 54 miles. How many miles is it from B to C?

27. How many miles farther is it from A to B than from B to C?

28. The floor of one room is 36 yd. long, and that of another 24 yd. long. How much longer is the one room than the other?

29. In a train of 28 box and coal cars, 8 are coal cars. How many are box cars?

30. There are 20 cars in one train and 25 in another. How many more cars are there in the latter?

31. From a train of 55 cars, 34 were taken away. How many were left?

32. Of 48 cars in a train, 36 are loaded. How many are empty?

33. If one carload weighs 55 tons and another 35 tons, what is the difference in their weights?

34. One coal car carries 35 tons, and another 49 tons. What is the difference in the weights of their loads?

35. Two box cars are loaded from 87 tons of cabbages; the first car carries 32 tons, the second 23 tons. How many tons are left?

36. A car when empty weighed 22 tons, and when loaded weighed 68 tons. What was the weight of its load?

37. Of the 29 street cars in a station in the morning, 17 are taken out for service. How many are left in the station?

38. Out of 94 passengers, 43 were children. How many were adults?

39. From a street car having 66 passengers, 23 got off. How many remained in the car?

40. From 98 bu. of potatoes, two wagon-loads, one of 25 bu. and the other of 30 bu., were taken. How many bushels remained?

41. The A class had 63 pupils, and the B class 51. How many more were there in the A class?

WHEN THE UPPER NUMBER IN UNITS' COLUMN IS LESS THAN THE LOWER NUMBER.

39. EXAMPLE: Laura has read 29 pages of an 82-page book. How many pages has she yet to read?

Take 29 from 82.

$$82 = 8 \text{ tens and } 2 \text{ units}$$

$$29 = 2 \text{ tens and } 9 \text{ units}$$

We cannot take 9 units from 2 units. Therefore we will take 1 ten from the 8 tens and add this 1 ten, or 10 units, to the 2 units. The example now stands:

$$\begin{array}{r} 82 = 7 \text{ tens and } 12 \text{ units} \quad 82 \\ 29 = 2 \text{ tens and } 9 \text{ units} \quad 29 \\ \hline 5 \text{ tens and } 3 \text{ units} \quad 53 \end{array}$$

9 units from 12 units leave 3 units, and 2 tens from 7 tens leave 5 tens. Or we may think "9 and 3 are 12," and write 3. Then we think "2 and 5 are 7," and write 5.

$$\text{Test: } 53 + 29 = 82.$$

Laura has 53 pages yet to read.

WRITTEN EXERCISES

Subtract and test by addition:

1. 74	4. 56	7. 43	10. 41	13. 55	16. 53
25	28	27	24	36	28
<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
2. 61	5. 42	8. 85	11. 65	14. 35	17. 83
17	19	38	46	18	64
<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
3. 97	6. 53	9. 81	12. 64	15. 72	18. 68
29	28	17	25	46	49
<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>

WHEN THE UPPER NUMBER IN UNITS' COLUMN IS ZERO.

40. EXAMPLE: Subtract 37 from 60.

60 = 6 tens and 0 units

37 = 3 tens and 7 units

Can we subtract 7 units from naught, or nothing? Then what must we do?

The example now stands:

60 = 5 tens and 10 units 60

37 = 3 tens and 7 units 37

2 tens and 3 units 23

We think "7 and 3 are 10," and write 3; "3 and 2 are 5," and write 2.

Test: $23 + 37 = 60$.

WRITTEN EXERCISES

Subtract and test by addition:

1. 30	3. 40	5. 100	7. 77	9. 47	11. 24
12	24	48	19	29	16
<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>

2. 87	4. 100	6. 62	8. 80	10. 40	12. 100
49	35	27	65	13	79
<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>

Solve:

13. Frank has read 63 pages of a book, and Jennie 38. How many pages more has Frank read than Jennie?

14. A man worked 52 hours one week, and a boy 37 hours. How many hours more did the man work?

15. When 29 pupils of a class of 47 are at the black-board, how many pupils are at their seats?

16. Fritz has earned 42 cents this week. How much can he spend and still have 25 cents left?

17. Ellen wishes to make some aprons; they will take 69 inches of gingham; she has 81 inches. How much will she have left?

REVIEW AND PRACTICE

ORAL EXERCISES

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1.	Add 12 to	17	27	57	37	67	47	97	87	77
2.	Add 13 to	18	28	58	38	68	48	98	88	78
3.	Add 9 to	18	28	58	38	68	48	98	88	78
4.	Add 16 to	13	23	53	33	63	43	93	83	73
5.	Add 15 to	19	29	59	39	69	49	99	89	79

Subtract the bottom number from each number in the column above it:

6.	7.	8.	9.	10.	11.	12.	13.	14.
30	38	45	65	30	70	45	53	38
45	54	76	67	45	49	76	76	57
67	76	68	88	84	56	68	68	77
84	86	49	94	67	93	49	49	83
93	92	55	63	56	84	55	55	91
56	55	84	59	93	67	84	84	55
49	48	67	78	49	28	67	67	48
70	76	46	56	75	51	70	46	76
100	100	100	100	100	100	100	100	100
19	27	36	43	21	17	35	33	28

15. $8 + 7 - 2 + 10 - 3 - 4 + 6 = ()?$

16. $14 + 8 + 2 - 6 + 3 + 5 + 10 = ()?$

17. $25 - 10 + 4 + 7 + 9 + 8 - 6 = ()?$

18. Each number in the columns below represents the number of cents paid for a purchase :



19
13
8
7
16
21

88
50
75
37
48
25

49
37
25
15
17
20

How many cents would be left out of a quarter of a dollar for each purchase in the first column ?

19. How many cents would be left out of a dollar for each purchase in the second column ?

20. How many would be left out of 50 cents for each purchase in the third column ?

WRITTEN EXERCISES

Write in figures the numbers :

1. Fifty. Fifty-four. Fifty-nine. Fifteen.
2. Seventy. Seventy-seven. Seventy-two. Twenty-seven.

3. Ninety. Ninety-five. Ninety-nine. Nineteen.

4. Thirty. Thirty-five. Thirty-six. Sixty-three.

5. Forty-five. Ninety-four. Forty-nine. Eighty-five.

Write in words :

6. 45 8. 60 10. 33 12. 31 14. 84

7. 54 9. 44 11. 28 13. 66 15. 32

Write in Roman notation :

16. 23 18. 20 20. 40 22. 48 24. 37

17. 15 19. 35 21. 19 23. 33 25. 50

Add :

26. 23	29. 18	32. 35	35. 19	38. 21
<u>47</u>	<u>76</u>	<u>24</u>	<u>73</u>	<u>79</u>

27. 21	30. 35	33. 17	36. 25	39. 50
7	20	43	10	16
<u>46</u>	<u>34</u>	<u>26</u>	<u>39</u>	<u>30</u>

28. 17	31. 56	34. 40	37. 21	40. 33
33	20	23	21	9
<u>40</u>	<u>24</u>	<u>18</u>	<u>21</u>	<u>41</u>

Subtract and test :

41. 64	43. 75	45. 43	47. 37	49. 90	51. 48
<u>27</u>	<u>36</u>	<u>18</u>	<u>28</u>	<u>36</u>	<u>23</u>

42. 53	44. 66	46. 80	48. 42	50. 69	52. 39
<u>26</u>	<u>48</u>	<u>39</u>	<u>26</u>	<u>24</u>	<u>12</u>

53. 78	55. 61	57. 95	59. 84	61. 57	63. 100
<u>48</u>	<u>19</u>	<u>78</u>	<u>37</u>	<u>37</u>	<u>59</u>
54. 57	56. 69	58. 81	60. 45	62. 32	64. 84
<u>29</u>	<u>38</u>	<u>55</u>	<u>26</u>	<u>18</u>	<u>14</u>

Solve :

65. Grant is 7 years old; his father is 32 years older; Grant's grandfather is 28 years older than his father. How much older than Grant is his grandfather?

66. A milkman starts on his round with 40 quart bottles of milk, and 16 pint bottles. He delivers all but 3 quart bottles and 5 pint bottles. How many pints has he sold? How many quarts?

67. There are 100 books in the library of the Boys' Club: 18 are biography; 20 are stories of travel; 6 are poetry; 13 are history; and the rest fiction. How many are fiction?

68. There are 28 children to-day in the primary room of a school, and 53 in the grammar grades; this is 17 more than were present yesterday. How many were in school yesterday?

69. An airship was sailed 37 minutes in its first flight; 53 minutes in its second; and 85 minutes in its third. How much longer was its second flight than its first? Its third than its second? Its third than its first?

70. What number is 13 less than $8 + 16 + 31 + 25 + 20$?

71. What number is 29 more than $36 - 14$?

MEASUREMENT

Dry Measure

41. PREPARATORY.

Grains and fruits are measured by the pint, quart, peck, half-peck, half-bushel, and bushel.



1. If the pint measure is filled with sand, and the sand is poured into the quart measure, how many times must this be done to fill the quart measure? How many pints are there in a quart?

2. How many times must the quart measure be used to fill the peck measure? How many quarts in a peck?

3. Similarly, how many pecks in a bushel?

<i>2 pints (pt.)</i>	<i>= 1 quart (qt.).</i>
<i>8 quarts</i>	<i>= 1 peck (pk.).</i>
<i>4 pecks</i>	<i>= 1 bushel (bu.).</i>
<i>32 quarts</i>	<i>= 1 bushel.</i>

ORAL EXERCISES

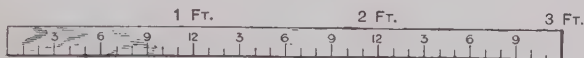
1. How many quarts are there in a bushel? How many pints are there in a peck?

2. A pint is what part of a quart?
3. A peck is what part of a bushel?
4. How many quarts in a half-peck? In 2 pk.?
5. How many half-pecks in a bushel?

Linear Measure

42. PREPARATORY.

1. Count the inches in 2 ft. 12 in. and 12 in. are how many inches?

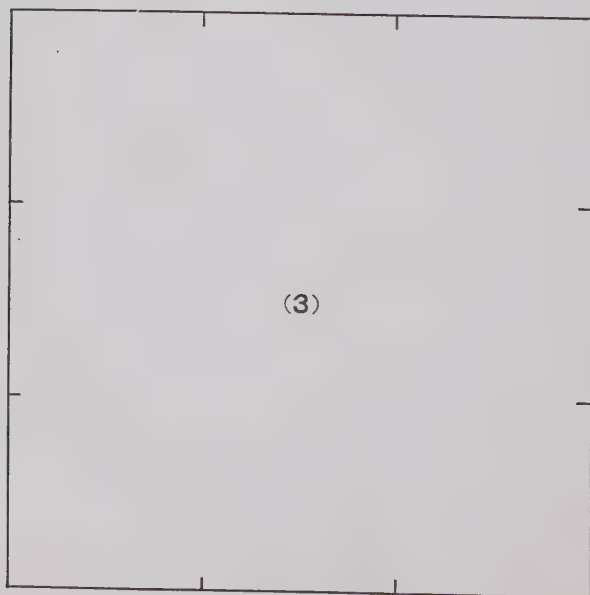
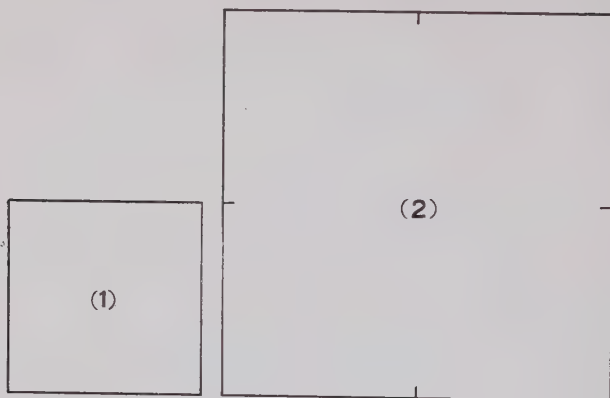


2. Count the inches in 3 ft. 12 in. and 12 in. and 12 in. are how many inches?
3. How many inches in a yard? In $\frac{1}{3}$ of a yd.?

36 inches make 1 yard (36 in. = 1 yd.).

ORAL EXERCISES

1. What part of a yard is a foot? What part of a yard are 2 ft.?
2. How many inches in 2 ft.? In $\frac{2}{3}$ of a yd.?
3. How many 6-inch lengths in a yard? A 6-inch length is what part of a yard?
4. Three 6-inch lengths are what part of a yard?
5. Find from the yard-stick: $\frac{1}{2}$ of 36; $\frac{1}{3}$ of 36; $\frac{1}{4}$ of 36; $\frac{2}{3}$ of 36; $\frac{3}{4}$ of 36; $\frac{1}{6}$ of 36; $\frac{5}{6}$ of 36.
6. Find: $\frac{1}{3}$ of 24; $\frac{2}{3}$ of 24; $\frac{1}{4}$ of 24; $\frac{3}{4}$ of 24.



WRITTEN EXERCISES

1. Draw on the blackboard a line 1 ft. long. A line 2 ft. long. A line 1 yd. long. Draw on your tablet lines 1 in. long, 2 in. long, and 3 in. long to represent them (that is, let 1 in. represent 1 ft.). Do this for other lines of different lengths.

2. Draw on the board a form 1 ft. by 3 ft. A form 2 ft. by 3 ft. Draw them on paper, using 1 in. for 1 ft.

3. Draw on the board a square 2 ft. on a side. Represent it on paper, using 1 in. for a foot.

4. What is the length and what is the width of the schoolroom? (Do not count parts of a yard.) Represent the schoolroom floor on paper, using 1 in. for 1 yd.

5. In the same way measure and represent the blackboard and other surfaces.

Square Measure

43. PREPARATORY.

1. Point out on page 68 the largest square. The smallest.

2. How many inches on a side is the first square? This is a 1-inch square. It contains 1 square inch.

3. How many inches on a side is the second square? This is a 2-inch square. How many square inches does it contain?

4. How many inches on a side is the third square? This is a 3-inch square. How many square inches does it contain?

*A square 1 inch on a side is called a square inch (sq. in.).
A square 1 foot on a side is called a square foot (sq. ft.).*

5. The surface of the first square on page 68 is what part of that of the second square?

6. Draw an oblong to show three 1-inch squares placed side by side. The surface of this form is what part of the surface of the largest square on page 68?

7. Draw an oblong that will be $\frac{2}{3}$ as large as the largest square on page 68.

8. Draw an oblong that will be twice as large as the 2-inch square.

9. Draw on the board a 3-foot square and divide it into square feet. How many square feet in a 3-foot square?

*A square 1 yard, or 3 feet, on a side is called a square yard.
9 square feet make 1 square yard (9 sq. ft. = 1 sq. yd.).*

ORAL EXERCISES

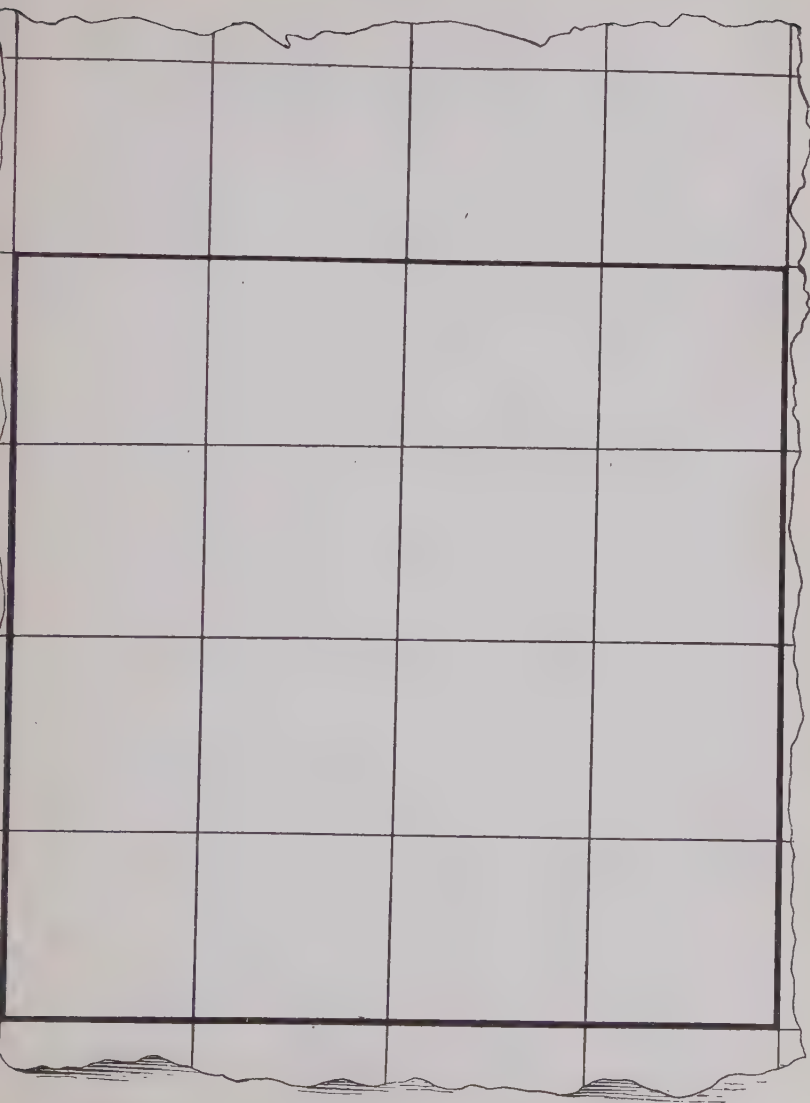
1. The heavy line in the picture on page 71 encloses a square. How many inches in each side of this square?

2. How many inch squares in each row of the 4-inch square?

3. How many square inches in a 4-inch square?

4. How many square inches in a 3-inch square?

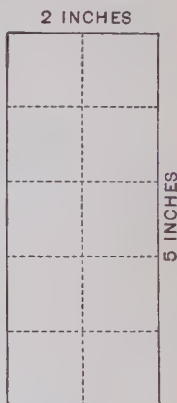
5. How many square inches in a 5-inch square?



WRITTEN EXERCISES

1. On squared paper mark a rectangle like this.
2. How many inches long is it? How many inches wide?
3. How many square inches in each row of squares?
4. How many square inches are there in the rectangle?
5. Draw a square containing 4 sq. in. How many inches is it on each side?
6. Draw a rectangle of different shape containing 4 square inches. What is its length? Its breadth?
7. Draw a square containing 9 sq. in. How many inches is it on each side?
8. How many inches is it around the square?
9. Draw an oblong containing 16 sq. in. What is its length? Its breadth?
10. Find the distance around a 2-inch square. A 3-inch square. A 4-inch square.
11. What is the length of the sides of a square containing 16 sq. in.? Of one containing 9 sq. in.?
12. Show by drawing squares and rectangles that :

3 times 4 are 12.	4 times 3 are 12.
6 times 3 are 18.	3 times 6 are 18.
5 times 3 are 15.	3 times 5 are 15.
13. Draw an oblong containing 18 sq. in. What is its length? Its breadth?



14. Show that $\frac{1}{2}$ of 8 is 4. That $\frac{1}{2}$ of 12 is 6. That $\frac{1}{2}$ of 16 is 8.

15. Show that $\frac{1}{3}$ of 9 is 3. That $\frac{1}{3}$ of 12 is 4. That $\frac{2}{3}$ of 15 is 10.

16. Show that $\frac{1}{4}$ of 16 is 4. That $\frac{1}{4}$ of 12 is 3. That $\frac{1}{4}$ of 20 is 5.

17. Draw a rectangle containing 12 sq. in. What is its length? Its breadth? Draw a rectangle of different shape, containing 12 sq. in.

18. Draw a rectangle equal to the sum of a 1-inch square and a 3-inch square.

19. Draw a rectangle equal to the sum of a 2-inch square and a 4-inch square.

20. Draw a square equal to the sum of a 3-inch square and a 4-inch square.

21. Show that a 4-inch square is 4 times as large as a 2-inch square.

22. Draw a rectangle 8 inches long and containing 16 sq. in.

23. Draw a rectangle 4 inches long and containing 12 sq. in.

24. If a square rug were 2 yd. on a side, how many square yards would it measure? How many square feet?

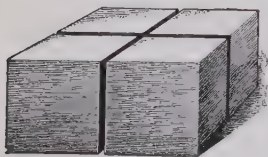
25. Draw a square equal to a rectangle 2 in. wide and 8 in. long.

26. Draw a rectangle 3 in. wide, containing 24 sq. in.

Cubic Measure

44. PREPARATORY.

1. How many cubes in each row in the picture?



2. How many cubes in this block?

3. If another such layer of cubes be placed on this block, how many will there be in all?

4. If each cube is an inch cube, how long will the block be? How wide? How high?

A cube 1-inch on an edge is called an inch cube, or a cubic inch (cu. in.).

A cube 2 inches on an edge is called a 2-inch cube.

ORAL EXERCISES

1. How long is an edge of a 3-inch cube?

2. How many inch cubes in a 3-inch cube?

3. How many in each layer? How many in the whole cube?

4. A solid contains 2 rows of 4 cubes each. How many cubes in it?

5. A solid contains 2 layers of inch cubes, each layer being 2 in. long by 3 in. wide and 1 in. thick. How many cubes in the solid?

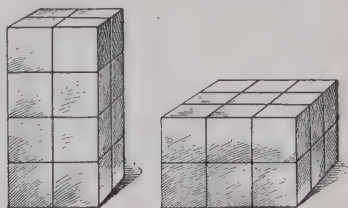
6. A solid contains 3 layers of inch cubes, each layer being 3 in. long by 2 in. wide, and 1 in. thick. How many cubes in the solid?

7. A solid contains 16 cubes in layers of 4 each. How many layers are there?

8. How high is a block built of 18 cubes, each layer being 3 rows of 3 cubes each?

9. How many inch cubes in a 2-inch cube?

10. How high is a block built of 20 cubes, each layer being 2 rows of 2 cubes each?



Measures of Time

45. PREPARATORY. /

1. Read in the picture the months in the year and the number of days in each.

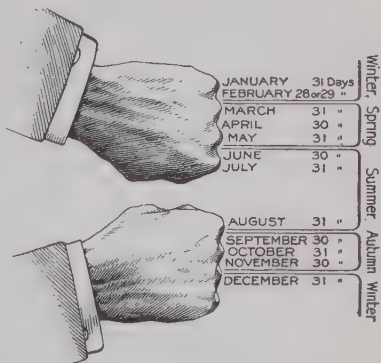
2. Name those that are opposite the knuckles.

3. How many days has each of these months?

4. Name those between the knuckles.

5. How many days in each except February?

6. What is the shortest month in the year?



In every 4th year (with certain exceptions) February has 29 days. These are called **leap years**. 1908 was a leap year.

7. Name the next leap year.

The long and short months of the year may be remembered in this way:

30 days have September,
April, June, and November.

All the rest have 31, except February. This has 28 days in short years, and in leap years 29.

8. Examine a clock or a watch and tell the number of minutes in an hour.

60 minutes (min.) = 1 hour (hr.).

24 hours = 1 day (da.).

7 days = 1 week (wk.).

WRITTEN EXERCISES

1. Find the number of days in the last 4 months--of the year.

2. Find the number of days in the first 3 months in a leap year.

3. How many hours in 2 days? In a day and one-half?

4. How many minutes are there in 1 hr. and 15 min.? In 1 hr. and 40 min.? In 1 hr. and 35 min.?

5. Add the numbers of days in September, October and November.

6. One day and 18 hr. are how many hours?

7. On a certain day of the year there were 13 hr. of daylight. How many hours of darkness were there?

8. How many days in the three months, May, June and July?

REVIEW AND PRACTICE

ORAL EXERCISES

1. How many feet in $\frac{2}{3}$ yd.?
2. How many inches in $\frac{1}{2}$ yd.?
3. How many square feet in 2 sq. yd.?
4. How many cubic inches in a 2-inch cube?
5. How many pecks in $\frac{3}{4}$ bu.?
6. How many quarts in $\frac{1}{2}$ bu.?
7. How many minutes in $1\frac{1}{2}$ hr.?
8. Name the months of the year that have 30 days.

WRITTEN EXERCISES

1. How many inches in $1\frac{1}{2}$ yd.?
2. How many quarts in $1\frac{1}{2}$ bu.?
3. How many days in July and August?
4. How many days in August, September, and October?
5. How many hours in 2 days?
6. How many minutes in 1 hr. and 28 min.?
7. Charles picked 8 qt. of berries and Henry picked 9 qt. How many pints did they pick in all?
8. Draw a square containing 16 sq. in.
9. Draw an oblong containing 16 sq. in.
10. Find the distance around each figure.

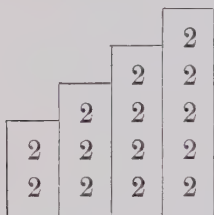
MULTIPLICATION AND DIVISION

Counting by Groups

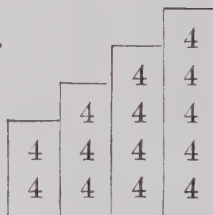
46. PREPARATORY.

State the sum of each column:

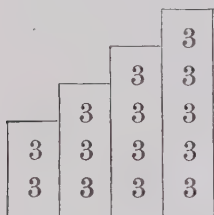
1.



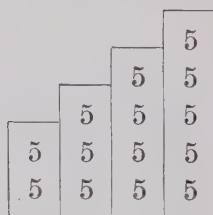
3.



2.



4.



Count:

1. By 3's from 3 to 30. Thus: 3, 6, 9, and so on.
2. By 5's from 5 to 50.
3. By 4's from 4 to 40.
4. By 2's from 20 back to 2.
5. By 5's from 50 back to 5.
6. By 3's from 30 back to 3.
7. By 4's from 40 back to 4.

Write:

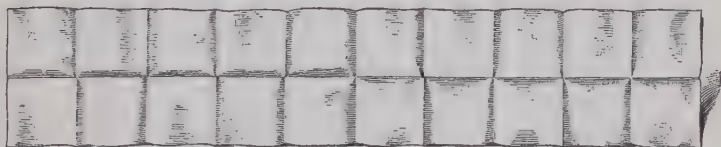
8. In figures, the numbers from 1 to 50, omitting every fifth number. In words, the numbers omitted.

9. In figures, the numbers from 1 to 40, omitting every fourth number. In words, the numbers omitted.

10. In figures, the numbers from 1 to 30, omitting every third number. In words, the numbers omitted.

Multiplying by Two

47. Take a strip of paper 10 in. long and 2 in. wide, and mark off the length and the width by inches. Fold at every mark, as shown in the picture.



1. How many squares wide is the paper? How many squares long? How many squares are there in the whole paper? How many squares are 10 times 2 squares?

2. How many are 4 times 2 squares?

3. How many squares are there in two rows of four squares each? How many are 2 times 4?

4. Find from the folded paper: 5 times 2; 6 times 2; 9 times 2; 8 times 2; 7 times 2.

5. Find from the folded paper: 2 times 5; 2 times 6; 2 times 9; 2 times 8; 2 times 7.

48. The sign \times , used for "times" in multiplication, is read also "multiplied by."

Thus, 2×4 means "two times four," or "two multiplied by four."

The tables are best read as follows:

"One two is two," "Two twos are four," and so on.

TABLE

$1 \times 2 = 2$	$6 \times 2 = 12$
$2 \times 2 = 4$	$7 \times 2 = 14$
$3 \times 2 = 6$	$8 \times 2 = 16$
$4 \times 2 = 8$	$9 \times 2 = 18$
$5 \times 2 = 10$	$10 \times 2 = 20$

49. 2, 4, 6, 8, 10, and so on, are multiples of 2.

ORAL EXERCISES

Read, and supply the missing numbers:

1. $2 \times 1 = (\quad)$.

6. $2 \times 6 = (\quad)$.

2. $2 \times 2 = (\quad)$.

7. $2 \times 7 = (\quad)$.

3. $2 \times 3 = (\quad)$.

8. $2 \times 8 = (\quad)$.

4. $2 \times 4 = (\quad)$.

9. $2 \times 9 = (\quad)$.

5. $2 \times 5 = (\quad)$.

10. $2 \times 10 = (\quad)$.

Solve:

11. How many times 2 make 18? Make 14?

12. By what number must 2 be multiplied to make 12? To make 6? To make 20?

13. How many times 2 are 14? 18?

14. What is the first multiple of 2? The second? The third? The sixth?

15. What is the cost of 8 pencils at 2 cts. each?

16. What is the cost of 2 pencils at 8 cts. each?

17. What is the cost of 5 papers at 2 cts. each? Of 2 papers at 5 cts. each?

50. EXAMPLE: Two boys picked 23 qt. of cherries. How many quarts did they pick altogether?

To answer this question, we must find the sum of 23 and 23. There is an easier way than column adding by which we can find the sum of two equal numbers. That is, we multiply 23 by 2.

(1)	(2)	
23	23	Instead of writing 23 twice, as in (1), and
23	2	saying "3 and 3 are 6," "2 and 2 are
<hr/> 46	<hr/> 46	4," we write 2 under 23, as in (2), and
		say "2 × 3 are 6," "2 × 2 are 4."

The two boys together picked 46 quarts.

How many units did we multiply? How many units in the answer? How many tens did we multiply? How many tens in the answer? Read the answer.

WRITTEN EXERCISES

Copy and multiply:

1. 14	3. 33	5. 31	7. 44	9. 24	11. 32
<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>
2. 13	4. 23	6. 42	8. 50	10. 11	12. 12
<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>

13. 22	14. 34	15. 43	16. 20	17. 41	18. 21
<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>

Solve:

19. Anna bought 2 tablets at 14 cts. each. How much did she pay for them?

20. Ralph has 2 books of 42 pages each. How many pages in the two books?

21. How many quarts in 2 bu.?

22. How many hours in 2 days?

23. How many ounces in 2 lb.?

24. Mary used 31 in. of ribbon to tie each of two packages. How much did she use for both?

Dividing by Two

51. PREPARATORY.

Take a piece of paper 2 in. wide and 10 in. long and fold it into 20 one-inch squares.

1. How many squares in each long row?

2. How many times 10 squares are 20 squares?

3. What part of 20 squares are 10 squares?

$$\frac{1}{2} \text{ of } 20 = 10. \quad 20 \text{ divided by } 2 = 10.$$

4. Find from the folded paper: $\frac{1}{2}$ of 8 squares, or 8 divided by 2; $\frac{1}{2}$ of 12 squares, or 12 divided by 2; $\frac{1}{2}$ of 18 squares, or 18 divided by 2.

52. Instead of writing "divided by," we may use the sign \div .

Thus, "20 divided by 2 = 10" is written $20 \div 2 = 10$.

TABLE

$2 \div 2 = 1$	$12 \div 2 = 6$
$4 \div 2 = 2$	$14 \div 2 = 7$
$6 \div 2 = 3$	$16 \div 2 = 8$
$8 \div 2 = 4$	$18 \div 2 = 9$
$10 \div 2 = 5$	$20 \div 2 = 10$

53. There is another way of writing division.

Thus, $6 \div 2 = 3$ may be written
$$\begin{array}{r} 3 \\ 2 \overline{)6} \end{array}$$

ORAL EXERCISES

Read, and supply the missing numbers :

- | | |
|-----------------------|------------------------|
| 1. $2 \div () = 2.$ | 6. $12 \div () = 2.$ |
| 2. $4 \div () = 2.$ | 7. $14 \div () = 2.$ |
| 3. $6 \div () = 2.$ | 8. $16 \div () = 2.$ |
| 4. $8 \div () = 2.$ | 9. $18 \div () = 2.$ |
| 5. $10 \div () = 2.$ | 10. $20 \div () = 2.$ |
11. $\frac{1}{2}$ of 12 = (). 13. $\frac{1}{2}$ of 8 = (). 15. $\frac{1}{2}$ of 6 = ().
 12. $18 \div 2 = ()$. 14. $12 \div 2 = ()$. 16. $14 \div 2 = ()$.

54. EXAMPLES :

1. A class of 46 was divided equally for a spelling contest. How many pupils were there on each side?

To answer this question we must divide 46 by 2.

$46 = 4 \text{ tens} + 6 \text{ units}$

Then,
$$\begin{array}{r} 2 \text{ tens} + 3 \text{ units} \\ 2 \overline{) 4 \text{ tens} + 6 \text{ units}} \end{array} \quad \text{or} \quad \begin{array}{r} 23 \\ 2 \overline{) 46} \end{array}$$

There were 23 pupils on each side.

2. To divide 80 by 2:

$$80 = 8 \text{ tens} + 0 \text{ units}$$

$$\begin{array}{r} 4 \text{ tens} + 0 \text{ units} \\ 2 \overline{) 8 \text{ tens} + 0 \text{ units}} \end{array} \quad \text{or} \quad \begin{array}{r} 40 \\ 2 \overline{) 80} \end{array}$$

In practice, use only the form at the right.

WRITTEN EXERCISES

Copy and divide:

- | | | | | |
|------------------------|------------------------|------------------------|-------------------------|-------------------------|
| 1. $2 \overline{) 28}$ | 4. $2 \overline{) 66}$ | 7. $2 \overline{) 60}$ | 10. $2 \overline{) 88}$ | 13. $2 \overline{) 26}$ |
| 2. $2 \overline{) 44}$ | 5. $2 \overline{) 68}$ | 8. $2 \overline{) 86}$ | 11. $2 \overline{) 40}$ | 14. $2 \overline{) 42}$ |
| 3. $2 \overline{) 24}$ | 6. $2 \overline{) 84}$ | 9. $2 \overline{) 48}$ | 12. $2 \overline{) 20}$ | 15. $2 \overline{) 64}$ |

Write in the form above and divide:

- | | | |
|--------------------------|--------------------------|--------------------------|
| 16. $\frac{1}{2}$ of 22. | 19. $\frac{1}{2}$ of 84. | 22. $\frac{1}{2}$ of 20. |
| 17. $\frac{1}{2}$ of 82. | 20. $\frac{1}{2}$ of 40. | 23. $\frac{1}{2}$ of 46. |
| 18. $\frac{1}{2}$ of 28. | 21. $\frac{1}{2}$ of 62. | 24. $\frac{1}{2}$ of 80. |

Solve:

25. How many quarts are there in 84 pt.?
26. A boy collected 84 cts. in selling papers and received one-half of this sum for his work. How many cents did he receive?
27. A piece of braid contained 42 inches; one-half of it was used on a jacket. How many inches were used?
28. How many hours in half a day?
29. How many days in $\frac{1}{2}$ of September?

Multiplying by Three**55. PREPARATORY.**

1. How many windows in each story above the first, as shown in the picture?

2. How many windows are there in 2 stories?

$$2 \times 3 \text{ windows} = (\quad) \text{ windows?}$$

3. How many windows in 3 stories?

$$3 \times 3 \text{ windows} = (\quad) \text{ windows?}$$

4. How many are there in 4 stories?

In 5 stories?

$$6 \times 3 \text{ windows} = (\quad) \text{ windows?}$$

TABLE

$1 \times 3 = 3$	$6 \times 3 = 18$
$2 \times 3 = 6$	$7 \times 3 = 21$
$3 \times 3 = 9$	$8 \times 3 = 24$
$4 \times 3 = 12$	$9 \times 3 = 27$
$5 \times 3 = 15$	$10 \times 3 = 30$



56. 3, 6, 9, 12, 15, and so on, are *multiples* of 3.

ORAL EXERCISES

Read, and supply the missing numbers:

1. $3 \times 1 = (\quad).$

6. $3 \times 6 = (\quad).$

2. $3 \times 2 = (\quad).$

7. $3 \times 7 = (\quad).$

3. $3 \times 3 = (\quad).$

8. $3 \times 8 = (\quad).$

4. $3 \times 4 = (\quad).$

9. $3 \times 9 = (\quad).$

5. $3 \times 5 = (\quad).$

10. $3 \times 10 = (\quad).$

Multiply:

11. 3	13. 2	15. 3	17. 3	19. 3	21. 10
8	3	6	9	1	3
<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>

12. 7	14. 4	16. 3	18. 9	20. 3	22. 1
3	3	5	3	4	3
<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>

Solve:

23. How many shoes do 3 horses need?

24. How many days are there in 3 weeks?

25. What is the cost of 3 melons at 8 cts. each? Of 8 apples at 3 cts. each?

26. Five triangles have how many sides in all?

27. How many feet are there in 2 yd.? In 6 yd.?

57. EXAMPLE: Ralph read 21 pages of a book on each of 3 days. How many did he read in all?

How can you find the answer to this question?

21	How many units do you multiply by 3? How
3	many units in the answer?
<hr/>	
63	How many tens do you multiply by 3? How
	many tens in the answer?

Ralph read 63 pages in all.

ORAL EXERCISES

Multiply:

1. 32	3. 22	5. 13	7. 30	9. 23	11. 20
3	3	3	3	3	3
<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>

2. 33	4. 10	6. 21	8. 12	10. 31	12. 11
3	3	3	3	3	3
<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>

58. EXAMPLE: Ralph solved 25 examples on each of 3 days. How many did he solve in all?

Multiply 25 by 3.

2 tens and 5 units = 25

3 times 5 units = $\begin{array}{r} 3 \\ 15 \end{array}$

or $\begin{array}{r} 25 \\ 3 \end{array}$

3 times 2 tens = 6 tens = $\begin{array}{r} 6 \end{array}$

$\begin{array}{r} 75 \end{array}$

Adding, 6 tens and 15 units = $\begin{array}{r} 75 \end{array}$

Ralph solved 75 examples in all.

In practice, we think "3 times 5 are 15," but write down in units' place only the 5. We keep in mind the 1 ten to add to the result in tens' place. That is, we think "3 times 2 tens are 6 tens, and 1 ten are 7 tens."

WRITTEN EXERCISES

Multiply:

1. $\begin{array}{r} 16 \\ 3 \\ \hline \end{array}$	4. $\begin{array}{r} 24 \\ 3 \\ \hline \end{array}$	7. $\begin{array}{r} 33 \\ 3 \\ \hline \end{array}$	10. $\begin{array}{r} 27 \\ 3 \\ \hline \end{array}$	13. $\begin{array}{r} 13 \\ 3 \\ \hline \end{array}$	16. $\begin{array}{r} 22 \\ 3 \\ \hline \end{array}$
---	---	---	--	--	--

2. $\begin{array}{r} 15 \\ 3 \\ \hline \end{array}$	5. $\begin{array}{r} 29 \\ 3 \\ \hline \end{array}$	8. $\begin{array}{r} 35 \\ 3 \\ \hline \end{array}$	11. $\begin{array}{r} 26 \\ 3 \\ \hline \end{array}$	14. $\begin{array}{r} 34 \\ 3 \\ \hline \end{array}$	17. $\begin{array}{r} 14 \\ 3 \\ \hline \end{array}$
---	---	---	--	--	--

3. $\begin{array}{r} 18 \\ 3 \\ \hline \end{array}$	6. $\begin{array}{r} 20 \\ 3 \\ \hline \end{array}$	9. $\begin{array}{r} 28 \\ 3 \\ \hline \end{array}$	12. $\begin{array}{r} 19 \\ 3 \\ \hline \end{array}$	15. $\begin{array}{r} 17 \\ 3 \\ \hline \end{array}$	18. $\begin{array}{r} 12 \\ 3 \\ \hline \end{array}$
---	---	---	--	--	--

Write as above and multiply:

19. 17×3	23. 31×3	27. 13×3	31. 3×26
20. 28×3	24. 3×21	28. 21×3	32. 24×3
21. 3×12	25. 3×30	29. 26×3	33. 14×3
22. 3×31	26. 18×3	30. 15×3	34. 27×3

Solve :

35. Clarence earned 26 cts. a day for 3 days, selling papers. How much did he earn in all?

36. A boy sold 3 bundles of papers for 28 cts. each. How many cents did he receive?

37. Elsie and Janet and Kate are earning money to buy their mother a present: Elsie makes three iron holders and sells them for 10 cts. apiece; Janet hems three handkerchiefs and sells them at 15 cts. apiece; Kate paints six dinner cards and sells them at 3 cts. apiece. How much money will they have?

38. A grocer had 4 crates of berries; 3 of them held 16 qt. each, and the other 24 qt. How many quarts in all did they hold?

Dividing by Three

59. By the use of the multiples of 3 we learn to divide by 3.

TABLE

$3 \div 3 = 1$	$18 \div 3 = 6$
$6 \div 3 = 2$	$21 \div 3 = 7$
$9 \div 3 = 3$	$24 \div 3 = 8$
$12 \div 3 = 4$	$27 \div 3 = 9$
$15 \div 3 = 5$	$30 \div 3 = 10$

ORAL EXERCISES

Read, and supply the missing numbers:

1. $3 \times () = 3.$

3. $3 \times () = 9.$

2. $3 \times () = 6.$

4. $3 \times () = 12.$

5. $3 \times () = 15.$

8. $3 \times () = 24.$

6. $3 \times () = 18.$

9. $3 \times () = 27.$

7. $3 \times () = 21.$

10. $3 \times () = 30.$

Divide:

11. $3 \overline{)6}$

13. $3 \overline{)9}$

15. $3 \overline{)18}$

17. $3 \overline{)24}$

12. $12 \div 3.$

14. $15 \div 3.$

16. $21 \div 3.$

18. $30 \div 3.$

Solve:

19. When calico is 3 cts. a yd., how many yards can be bought for 12 cts.? For 30 cts.? For 18 cts.?

20. When 3 bunches of braid cost 24 cts., what does 1 bunch cost?

21. When 3 yd. of ribbon cost 12 cts., what does 1 yd. cost?

22. When 3 skeins of silk cost 18 cts., what does 1 skein cost?

23. Clara paid 15 cts. for a set of 5 picture cards. How much was each card worth?

60. EXAMPLE: Clara had 63 cts.; she wanted to divide it equally to put one part into her bank, to spend one part, and to give one part to the Sunday School. How much could she have for each use?

How can you find the answer to this question?

21 How many tens do you divide by 3? How many
 $3 \overline{)63}$ tens in the answer?
 How many units do you divide by 3? How many
 units in the answer?

Clara had 21 cents for each use.

ORAL EXERCISES

Divide :

1. $3\overline{)33}$ 2. $3\overline{)69}$ 3. $3\overline{)90}$ 4. $3\overline{)39}$ 5. $3\overline{)96}$ 6. $3\overline{)66}$

Find :

7. $\frac{1}{3}$ of 36. 9. $\frac{1}{3}$ of 60. 11. $\frac{1}{3}$ of 93.

8. $\frac{1}{3}$ of 66. 10. $\frac{1}{3}$ of 63. 12. $\frac{1}{3}$ of 69.

13. In each of these numbers, there are how many 3's and how many 1's over?

11 17 43 19 22 31 56 28 38 46 74 51

61. EXAMPLE: Mary divided 51 cts. into 3 equal parts. How many cents did she have in each part?

$$51 = 5 \text{ tens} + 1 \text{ unit.}$$

$$\begin{array}{r} 17 \\ 3 \overline{) 51} \end{array}$$

$$5 \text{ tens} \div 3 = 1 \text{ ten; with 2 tens, or 20 units, not yet divided.}$$

$$20 \text{ units} + 1 \text{ unit} = 21 \text{ units.}$$

$$21 \text{ units} \div 3 = 7 \text{ units.}$$

Mary had 17 cents in each part.

In dividing 51 by 3, think "3 into 5, once and 2 over," and write 1 above the tens; "3 into 21 seven times," and write 7 above the units.

WRITTEN EXERCISES

Copy and divide :

1. $3\overline{)75}$ 4. $3\overline{)42}$ 7. $3\overline{)57}$ 10. $3\overline{)54}$ 13. $3\overline{)99}$
 2. $3\overline{)48}$ 5. $3\overline{)66}$ 8. $3\overline{)36}$ 11. $3\overline{)84}$ 14. $3\overline{)45}$
 3. $3\overline{)63}$ 6. $3\overline{)87}$ 9. $3\overline{)81}$ 12. $3\overline{)69}$ 15. $3\overline{)51}$

Solve:

16. Lucy paid 48 cts. for ribbon at 3 cts. a yd. How many yards did she buy?

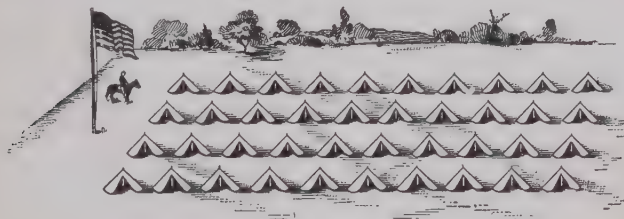
17. Grace paid 78 cts. for tape at 3 cts. a yd. How many yards did she buy?

18. How many bunches of celery at 3 cts. a bunch can be bought for 45 cts.? For 81 cts.?

19. How many bunches of radishes at 3 cts. a bunch can be bought for 66 cts.? For 42 cts.? For 90 cts.? 48 cts.? 57 cts.? 84 cts.?

Multiplying by Four

62. PREPARATORY.



1. How many tents in each short row?

2. How many tents in 2 of these rows? In 3 of them?

4×2 tents = () tents? 2×4 tents = () tents?

3. Count the tents in the short rows in the picture and answer these questions:

2×4 tents = () tents? 5×4 tents = () tents?

3×4 tents = () tents? 6×4 tents = () tents?

4×4 tents = () tents? 10×4 tents = () tents?

4. If there are 4 soldiers in each tent, how many soldiers are there in 2 tents? In 3 tents? In 4 tents? In 5 tents? In 10 tents? In 8? In 7? In 6?

5. How many tents are there in each of the long rows? How many of these rows are there?

4×10 tents = () tents? 10×4 tents = () tents?

6. Count by fours from 4 to 40.

63. 4, 8, 12, 16, 20, and so on, are multiples of 4.

TABLE

$1 \times 4 = 4$	$6 \times 4 = 24$
$2 \times 4 = 8$	$7 \times 4 = 28$
$3 \times 4 = 12$	$8 \times 4 = 32$
$4 \times 4 = 16$	$9 \times 4 = 36$
$5 \times 4 = 20$	$10 \times 4 = 40$

ORAL EXERCISES

Read, and supply the missing numbers :

1. $4 \times 1 = ()$.

6. $4 \times 6 = ()$.

2. $4 \times 2 = ()$.

7. $4 \times 7 = ()$.

3. $4 \times 3 = ()$.

8. $4 \times 8 = ()$.

4. $4 \times 4 = ()$.

9. $4 \times 9 = ()$.

5. $4 \times 5 = ()$.

10. $4 \times 10 = ()$.

Solve :

11. What is the cost of 4 yd. of ribbon at 3 cts. a yd.? Of 3 yd. of ribbon at 4 cts. a yd.?

12. Compare the number of trees in 9 rows of 4 each with the number in 4 rows of 9 each.

13. Another box contains 4 rows of 6 fruit jars each. How many jars are there?

14. One box contained 6 rows of 4 fruit jars each. How many jars in the box?

15. How many shoes are needed to shoe 1 horse? 2 horses? 5? 8? 10? 7? 4? 6?

16. If 4 nails are used on each side of a shoe, how many nails are used for 1 shoe? For 2? 3? 4?

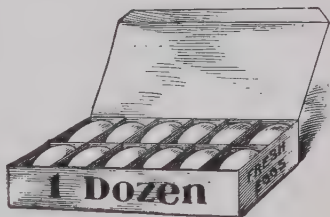
12 single things make 1 dozen. $12 = 1 \text{ doz.}$

17. Eggs are sold by the dozen. How many eggs in a short row in this case?

18. How many in 3 rows?

19. How many things in a half dozen?

20. In counting eggs from a basket it is convenient to take them up 3 at a time. What do 4 handfuls make?



64. EXAMPLE: How many quarts in 25 gal.?

Multiply 25 by 4.

We think "1 gal. is 4 qt., hence 25 gal. are 25 times 4 qt."; but it is easier to multiply 25 by 4, and we may do this since 4 times 25 is the same as 25 times 4.

$\begin{array}{r} 25 \\ 4 \\ \hline 100 \end{array}$	<p>How many units do you multiply? How many tens is this? What is the result?</p> <p>How many tens do you multiply? How many tens do you add to this? Why?</p>
--	--

There are 100 qt. in 25 gal.

WRITTEN EXERCISES

Multiply:

1. 24 4 —	3. 17 4 —	5. 15 4 —	7. 25 4 —	9. 19 4 —	11. 20 4 —
2. 18 4 —	4. 16 4 —	6. 21 4 —	8. 14 4 —	10. 23 4 —	12. 22 4 —

Solve:

13. How many quarts in a gallon? In 23 gal.?
14. How many quarters in a dollar? In 18 dollars?
15. What is the cost of 15 tablets at 4 cts. each?
16. What is the cost of 20 pencils at 4 cts. each?
17. What do 18 yd. of calico cost at 4 cts. a yd.?
18. How many girls in 14 rows of 4 each? How many in 4 rows of 14 each?
19. How many boys in 4 classes of 17 each?
20. How many bean stalks in 4 rows of 24 each?

Dividing by Four

65. By use of the multiples of 4 we learn to divide by 4.

TABLE

$4 \div 4 = 1$	$24 \div 4 = 6$
$8 \div 4 = 2$	$28 \div 4 = 7$
$12 \div 4 = 3$	$32 \div 4 = 8$
$16 \div 4 = 4$	$36 \div 4 = 9$
$20 \div 4 = 5$	$40 \div 4 = 10$

ORAL EXERCISES

Read, and supply the missing numbers :

1. $4 \div () = 4.$

6. $24 \div () = 4.$

2. $8 \div () = 4.$

7. $28 \div () = 4.$

3. $12 \div () = 4.$

8. $32 \div () = 4.$

4. $16 \div () = 4.$

9. $36 \div () = 4.$

5. $20 \div () = 4.$

10. $40 \div () = 4.$

11. In each of these numbers there are how many 4's and how many 1's over?

13 22 17 30 35 18 33 29 39 31

66. EXAMPLE: Mabel copied $\frac{1}{4}$ of 100 words. How many words did she copy?

Divide 100 by 4.

25 To divide 100 by 4 we think, " $\frac{1}{4}$ of 10 tens is
4)100 2 tens and 2 tens over; 2 tens are 20 units,
and $\frac{1}{4}$ of 20 units is 5 units."

Mabel copied 25 words.

WRITTEN EXERCISES

Copy and divide :

1. $16 \div 4.$

3. $12 \div 4.$

5. $24 \div 4.$

2. $20 \div 4.$

4. $8 \div 4.$

6. $40 \div 4.$

7. $4 \overline{)88}$

11. $4 \overline{)76}$

15. $4 \overline{)48}$

19. $4 \overline{)60}$

8. $4 \overline{)56}$

12. $4 \overline{)32}$

16. $4 \overline{)84}$

20. $4 \overline{)52}$

9. $4 \overline{)72}$

13. $4 \overline{)64}$

17. $4 \overline{)44}$

21. $4 \overline{)92}$

10. $4 \overline{)36}$

14. $4 \overline{)80}$

18. $4 \overline{)96}$

22. $4 \overline{)68}$

Find $\frac{1}{4}$ of:

23. 32 44 84 88 56 40 64 68

24. 56 92 76 52 80 100 96 72

Solve:

25. How many 4-inch lengths in a yard? In 24 in.? In 72 in.?

26. 56 pupils stand in 4 equal rows. How many pupils in each row?

27. 4 men earning equal monthly wages receive \$80. How much does each get?

28. A piece of cloth 96 yd. long was cut into 4 equal pieces. How many yards in each piece?

29. How many bushels in 68 pk.? In 28 pk.?

30. How many gallons in 44 qt.? In 92 qt.?

Multiplying by Five

67. PREPARATORY.

1. How many lines are used to make each of these chairs?



2. How many lines in two of the chairs? In 3 of them? In 4 of them? In 5 of them?

3. 5 lines and 5 lines, or 2×5 lines, = () lines?

4. 3×5 lines = () lines? 4×5 lines = () lines?

5. $5 \times 5 =$ ()? $7 \times 5 =$ ()? $6 \times 5 =$ ()?

6. $9 \times 5 =$ ()? $8 \times 5 =$ ()? $10 \times 5 =$ ()?

7. How many sides has this figure?
How many sides have 2 pentagons? 3
pentagons? 5 pentagons?



PENTAGON.

8. Count by fives to 50, and write the numbers as you count.

TABLE

$1 \times 5 = 5$	$6 \times 5 = 30$
$2 \times 5 = 10$	$7 \times 5 = 35$
$3 \times 5 = 15$	$8 \times 5 = 40$
$4 \times 5 = 20$	$9 \times 5 = 45$
$5 \times 5 = 25$	$10 \times 5 = 50$

ORAL EXERCISES

Read, and supply the missing numbers:

1. $5 \times 1 = (\quad).$

6. $5 \times 6 = (\quad).$

2. $5 \times 2 = (\quad).$

7. $5 \times 7 = (\quad).$

3. $5 \times 3 = (\quad).$

8. $5 \times 8 = (\quad).$

4. $5 \times 4 = (\quad).$

9. $5 \times 9 = (\quad).$

5. $5 \times 5 = (\quad).$

10. $5 \times 10 = (\quad).$

11.

$$\begin{array}{r} \overbrace{5 \quad 1} \\ \times 1 \quad \times 5 \end{array}$$

12.

$$\begin{array}{r} \overbrace{5 \quad 2} \\ \times 2 \quad \times 5 \end{array}$$

13.

$$\begin{array}{r} \overbrace{5 \quad 3} \\ \times 3 \quad \times 5 \end{array}$$

14.

$$\begin{array}{r} \overbrace{5 \quad 9} \\ \times 9 \quad \times 5 \end{array}$$

15. Three fives are (). Five threes are ().

16. Six fives are (). Five sixes are ().

17. Eight fives are (). Five eights are ().

18. Seven fives are (). Five sevens are ().

Solve:

19. Compare the value of 2 five-cent pieces with that of 5 two-cent pieces.

20. What is the cost of 7 popcorn balls at 5 cts. each? Of 5 lb. of dates at 7 cts. a lb.?

21. How many plants in 6 rows of 5 each? In 5 rows of 6 each?

WRITTEN EXERCISES

Copy and multiply:

$$\begin{array}{r} 1. \ 18 \\ \underline{5} \end{array}$$

$$\begin{array}{r} 3. \ 20 \\ \underline{5} \end{array}$$

$$\begin{array}{r} 5. \ 15 \\ \underline{5} \end{array}$$

$$\begin{array}{r} 7. \ 13 \\ \underline{5} \end{array}$$

$$\begin{array}{r} 9. \ 11 \\ \underline{5} \end{array}$$

$$\begin{array}{r} 2. \ 17 \\ \underline{5} \end{array}$$

$$\begin{array}{r} 4. \ 19 \\ \underline{5} \end{array}$$

$$\begin{array}{r} 6. \ 12 \\ \underline{5} \end{array}$$

$$\begin{array}{r} 8. \ 14 \\ \underline{5} \end{array}$$

$$\begin{array}{r} 10. \ 16 \\ \underline{5} \end{array}$$

Solve:

11. What is the cost of 5 desks at \$20 each?

12. What is the cost of 5 lb. of butter at 19 cts. a lb.?

13. What is the cost of 5 pads at 12 cts. each?

14. How many pupils in 5 rows of 16 each?

15. How many seats in 5 rows of 12 each?

16. What is the cost of 13 yd. of cloth at 5 cts. a yd.?

17. How many cents are 18 five-cent pieces worth?

18. How many cents are 14 five-cent pieces worth?

19. A roll of carpet contains 5 strips of 15 yd. each. How many yards in the whole roll?

20. How many school days in a school year of 36 weeks, not counting out holidays?

Dividing by Five

68. PREPARATORY.

1. How many fives in 20? In 30? In 25? In 45?
In 35? In 50? In 15?

2. How many 5-cent pieces are worth as much as a dime?

3. How many 5-cent pieces are worth as much as a quarter?

TABLE

$5 \div 5 = 1$	$30 \div 5 = 6$
$10 \div 5 = 2$	$35 \div 5 = 7$
$15 \div 5 = 3$	$40 \div 5 = 8$
$20 \div 5 = 4$	$45 \div 5 = 9$
$25 \div 5 = 5$	$50 \div 5 = 10$

ORAL EXERCISES

Read, and supply the missing numbers:

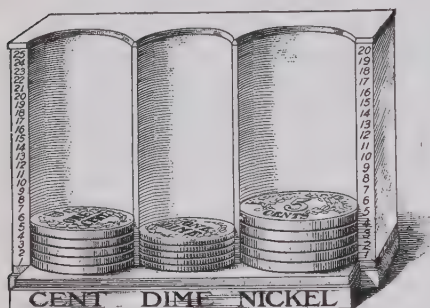
- | | |
|-----------------------|------------------------|
| 1. $5 \div () = 5.$ | 6. $30 \div () = 5.$ |
| 2. $10 \div () = 5.$ | 7. $35 \div () = 5.$ |
| 3. $15 \div () = 5.$ | 8. $40 \div () = 5.$ |
| 4. $20 \div () = 5.$ | 9. $45 \div () = 5.$ |
| 5. $25 \div () = 5.$ | 10. $50 \div () = 5.$ |

In each of these numbers there are how many 5's and how many 1's over?

- | | | | | | | | |
|--------|----|----|----|----|----|----|----|
| 11. 11 | 14 | 17 | 18 | 23 | 21 | 28 | 27 |
| 12. 31 | 51 | 29 | 43 | 19 | 39 | 13 | 46 |

Solve :

13. How many five-cent pieces in the rack shown in the picture? How many dimes? How many one-cent pieces?



14. How many nickels is 1 dime worth? How many nickels are 2 dimes worth? 4 dimes? 5 dimes?

15. If 7 five-cent pieces are taken out of the rack, how many dimes and one-cent pieces will make up the amount?

16. How many dimes will make up for 8 five-cent pieces? For 4? For 10?

17. I take out of the rack the amounts given below; I replace each sum as far as I can by five-cent pieces, and the rest by cents. How many of each coin do I use?

37 cents	26 cents	43 cents	48 cents
49 cents	17 cents	32 cents	23 cents

18. The cent column twice full is worth how many cents? How many five-cent pieces? How many dimes?

WRITTEN EXERCISES

Copy and divide :

- | | | |
|-----------------|-----------------|-----------------|
| 1. $25 \div 5.$ | 3. $40 \div 5.$ | 5. $50 \div 5.$ |
| 2. $30 \div 5.$ | 4. $15 \div 5.$ | 6. $10 \div 5.$ |

7. $5\overline{)15}$	11. $5\overline{)25}$	15. $5\overline{)50}$	19. $5\overline{)50}$
8. $5\overline{)20}$	12. $5\overline{)10}$	16. $5\overline{)40}$	20. $5\overline{)65}$
9. $5\overline{)90}$	13. $5\overline{)60}$	17. $5\overline{)55}$	21. $5\overline{)85}$
10. $5\overline{)70}$	14. $5\overline{)95}$	18. $5\overline{)75}$	22. $5\overline{)100}$

Find $\frac{1}{5}$ of:

23. 85.	26. 60.	29. 75.	32. 100.	35. 90.
24. 45.	27. 65.	30. 95.	33. 55.	36. 70.
25. 80.	28. 40.	31. 30.	34. 25.	37. 35.

Solve:

38. How many yards of calico at 5 cts. a yd. can be bought for 75 cts.?

39. How many 5-cent pencils can be bought for 65 cts.?

40. How many 5-yard lengths can be cut from a roll of carpet containing 55 yd.?

41. An automobile course was 5 mi. around. How many times must an automobile go around the course to travel 75 mi.? To travel 60 mi.? 100 mi.? 85 mi.?

42. A grocer had 70 bu. of apples and sold $\frac{1}{5}$ of them. How many bushels did he sell?

43. Lawrence had a kite string 45 ft. long, and lost $\frac{1}{5}$ of it. How many feet of string had he left?

44. How many 5-cent milk tickets can be bought with 95 cts.?

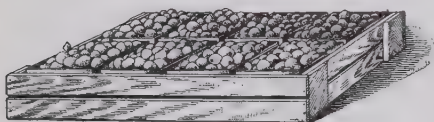
45. How many 5-cent car fares can be paid with 65 cts.?

FRACTIONS

Halves, Fourths, and Eighths

69. The picture shows a peck of strawberries.

1. How many quarts in a peck?



One of the eight equal parts of anything is called one-eighth.

2. 1 qt. is what part of a peck?

3. 2 qt. are how many eighths of a peck? 4 qt. are how many eighths?

4. 3 qt. are how many eighths of a peck? 5 qt.?

ORAL EXERCISES

1. How many quarts in a half of a peck? How many eighths of a peck in a half of a peck?

2. How many quarts in a fourth of a peck? How many eighths of a peck in a fourth of a peck?

3. 6 qt. are how many eighths of a peck? How many fourths of a peck?

4. 4 qt. are how many eighths of a peck? How many halves of a peck?

5. 4 hr. is what part of an 8-hour working day?

WRITTEN EXERCISES

1. Draw a rectangle composed of 8 squares and shade $\frac{1}{2}$ of it. How many eighths of it are shaded?

2. In the same way show that :

$\frac{1}{4}$ of the rectangle equals $\frac{2}{8}$ of it ;

$\frac{3}{4}$ of the rectangle equals $\frac{6}{8}$ of it ;

$\frac{2}{4}$ of the rectangle equals $\frac{4}{8}$ of it.

Fifths and Tenths

70. Draw four figures like those pictured here.



FIG. 1.



FIG. 2.

1. Into how many equal parts is Figure 1 divided ?
Figure 2 ?

One-fifth of anything is one of its five equal parts.

2. How many 2's in 10 ? 2 is what part of 10 ?

3. How many 4's in 20 ? 4 is what part of 20 ?



FIG. 3.

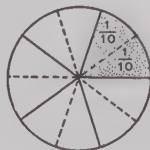


FIG. 4.

4. Into how many equal parts is Figure 3 divided ?
Figure 4 ?

One-tenth of anything is one of its ten equal parts.

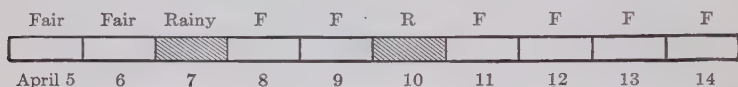
5. How many tenths are there in $\frac{1}{5}$, as shown in Figure 3 ? How many tenths in $\frac{2}{5}$? In $\frac{4}{5}$?

6. Show that :

5 fifths equal one whole.	10 tenths equal one whole.
2 tenths equal 1 fifth.	4 tenths equal 2 fifths.
6 tenths equal 3 fifths.	8 tenths equal 4 fifths.

ORAL EXERCISES

1. The diagram shows the number of rainy days from April 5th to April 14th.



Count the number of spaces. How many are shaded ?

2. How many days were rainy ? What part of the 10 days was rainy ?

3. What part of the ten days was fair ?

4. If, from 10 blocks, 2 white and 3 red ones are taken, what part of the whole number is taken ?

5. From 10 blocks 8 are taken. What part of the whole number is left ?

6. Arthur planted 20 seeds ; $\frac{1}{10}$ of them were scarlet runners, $\frac{1}{5}$ of them were nasturtiums, and the rest sweet peas. How many of each did he plant ?

7. Susie planted 15 beans, of which 10 grew. What part of the number planted did not grow ?

8. From 20 books $\frac{1}{5}$ were taken. How many books were taken ?

9. From 20 apples $\frac{4}{10}$ were taken. How many apples were taken ?

WRITTEN EXERCISES

1. Make 10 equal strokes; cross out $\frac{1}{2}$ of them. How many tenths of the whole number are crossed out? How many tenths remain?

2. Make 10 equal strokes; cross out $\frac{2}{5}$ of them. How many tenths of the whole number are crossed out? How many tenths remain?

3. If convenient, keep a record of the weather for 10 days and make a picture like the one on page 104. Then find what part of the time was rainy.

Finding Parts of Numbers

71. PREPARATORY.

1. How many are $\frac{1}{3}$ of 12?

2. $\frac{2}{3}$ of a number is 2 times as many as $\frac{1}{3}$ of it. How many are $\frac{2}{3}$ of 12?

3. In the same way, $\frac{1}{3}$ of 15 is 5. How many are $\frac{2}{3}$ of 15?

4. What is $\frac{1}{4}$ of 20? What is $\frac{3}{4}$ of 20?

72. EXAMPLE: Clara had 52 words to learn, and she has learned $\frac{3}{4}$ of them. How many words is this?

$$\frac{1}{4} \text{ of } 52 = 13. \quad \frac{3}{4} \text{ of } 52 \text{ is } 3 \times 13 = 39.$$

Clara had learned 39 words.

WRITTEN EXERCISES

Find:

- | | | | |
|-------------------------|-------------------------|-------------------------|--------------------------|
| 1. $\frac{2}{3}$ of 48. | 3. $\frac{3}{4}$ of 84. | 5. $\frac{3}{5}$ of 50. | 7. $\frac{4}{5}$ of 85. |
| 2. $\frac{2}{3}$ of 72. | 4. $\frac{3}{4}$ of 68. | 6. $\frac{2}{5}$ of 75. | 8. $\frac{4}{5}$ of 100. |

9. $\frac{2}{5}$ of 65. 13. $\frac{1}{4}$ of 84. 17. $\frac{1}{5}$ of 95. 21. $\frac{3}{4}$ of 96.
10. $\frac{2}{5}$ of 45. 14. $\frac{1}{4}$ of 96. 18. $\frac{1}{5}$ of 55. 22. $\frac{3}{4}$ of 36.
11. $\frac{3}{5}$ of 25. 15. $\frac{1}{4}$ of 36. 19. $\frac{1}{5}$ of 35. 23. $\frac{3}{4}$ of 72.
12. $\frac{3}{5}$ of 20. 16. $\frac{1}{4}$ of 56. 20. $\frac{1}{5}$ of 85. 24. $\frac{4}{5}$ of 65.

Solve :

25. A man spent $\frac{3}{4}$ of \$92 for a wagon. How many dollars did the wagon cost?

26. A postman walked $\frac{2}{5}$ of 85 mi. in a day. How many miles did he walk?

27. If $\frac{3}{5}$ of a load of 90 bu. of apples are greenings, how many bushels of greenings are there in the load?

28. A train consisted of 56 cars; $\frac{3}{4}$ of them were coal cars and the rest box cars. How many coal cars were there, and how many box cars?

29. A bookcase contained 96 books; $\frac{1}{4}$ of them were books of history, and the rest fiction. How many were books of fiction?

30. A man traveled 100 miles; $\frac{4}{5}$ of the distance he went by rail. How many miles did he travel by rail?

31. Charles picked $\frac{3}{4}$ of a bushel of cherries. How many quarts did he pick?

32. Frank and Mary had a contest in shelling peas; when the pan was empty, Mary had shelled 90 pods, and Frank had shelled $\frac{4}{5}$ as many. Which won the race? How many pods were in the pan at first?

33. A class contained 45 pupils. $\frac{2}{3}$ of them were boys and the rest girls. How many boys were there in the class? How many girls?

REVIEW AND PRACTICE

ORAL EXERCISES

Read, and fill the blanks :

1. $6 = () 3's.$ $12 = () 3's.$ $9 = () 3's.$
2. $12 = () 4's.$ $8 = () 4's.$ $20 = () 4's.$
3. $10 = () 5's.$ $20 = () 5's.$ $15 = () 5's.$
4. $\frac{1}{2}$ of $10 = ().$ $\frac{1}{2}$ of $100 = ().$ $\frac{1}{2}$ of $20 = ().$
5. $\frac{1}{3}$ of $3 = ().$ $\frac{1}{3}$ of $30 = ().$ $\frac{1}{3}$ of $60 = ().$
6. $\frac{1}{3}$ of $9 = ().$ $\frac{1}{3}$ of $12 = ().$ $\frac{2}{3}$ of $12 = ().$
7. $\frac{1}{4}$ of $8 = ().$ $\frac{1}{4}$ of $12 = ().$ $\frac{3}{4}$ of $12 = ().$
8. $\frac{1}{5}$ of $30 = ().$ $\frac{2}{5}$ of $40 = ().$ $\frac{3}{5}$ of $40 = ().$
9. $\frac{1}{8}$ of $40 = ().$ $\frac{1}{8}$ of $56 = ().$ $\frac{3}{8}$ of $80 = ().$
10. $\frac{1}{10}$ of $50 = ().$ $\frac{3}{10}$ of $30 = ().$ $\frac{2}{3}$ of $60 = ().$

Solve :

11. How long is a rectangle that is 3 in. wide and contains 12 sq. in.?

12. How long is the side of a square that contains 9 sq. in.?

13. How many cents in 8 dimes? In 5 dimes? 4 dimes? 6 dimes? 10 dimes?

14. At 4 cts. a qt., what is the cost of 1 gal. of milk?

15. Walter was absent $\frac{1}{5}$ of 20 days. How many days was he absent?

16. If the distance around a triangle of equal sides is 12 in., what is the length of each side?

WRITTEN EXERCISES

Multiply:

1. 29 2 —	3. 44 2 —	5. 27 3 —	7. 18 3 —	9. 15 4 —	11. 25 4 —
2. 23 4 —	4. 16 5 —	6. 19 5 —	8. 33 3 —	10. 48 2 —	12. 18 5 —

Divide:

13. $3\overline{)75}$	15. $4\overline{)48}$	17. $3\overline{)36}$	19. $4\overline{)72}$	21. $2\overline{)84}$
14. $5\overline{)65}$	16. $5\overline{)85}$	18. $3\overline{)87}$	20. $3\overline{)54}$	22. $4\overline{)64}$

Solve:

23. Draw a rectangle 6 in. long, containing 18 sq. in.

24. If a rectangle 5 in. long and 3 in. wide is covered with 2 layers of 1-inch cubes, how many cubes are there?

25. How much would it cost to take a 5-cent weekly paper for 1 year (52 weeks)?

26. If 3 oranges are used every morning for breakfast, how many days will 54 oranges last?

27. 5 lb. of figs cost 65 cts. How much were they a pound?

28. An iron bar 4 ft. long is made into 6-inch bolts. How many bolts in the bar?

29. What is the cost of 8 qt. of berries at 5 cts. a qt. and 10 lb. of sugar at 4 cts. a lb.?

30. How many gallons in 40 qt.? How many gallons in 84 qt.? In 72 qt.? In 96 qt.?

31. How many bushels are there in 28 pk. of onions? In 68 pk.? In 40 pk.?

32. Clarence bought 9 oranges at 4 cts. each, and 8 lemons at 3 cts. each. How many cents did he pay for both? What was the change out of $\frac{3}{4}$ of a dollar?

9×4 cts. = () cts.?
8×3 cts. = () cts.?
Total = () cts.?

33. What is the cost of a dozen oranges at 4 cts. an orange and 2 doz. bananas at 25 cts. a doz.?

34. Charles bought 2 doz. popcorn balls at 3 cts. a ball; he gave the clerk 1 dollar. What change did he receive?

35. He tried to sell the popcorn at 4 cts. a ball, but could sell only $\frac{1}{4}$ of it. How much money did he lose on all he bought?

36. Emma learned 4 new words a day every school day for 4 weeks. How many new words did she learn?

37. A clerk has 75 lb. of newspapers to send out; he can mail them in 4-pound packages at 4 cts. a lb. How many such packages will they make? How much postage will the packages cost? Will there be any papers remaining? At the same rate of postage how much would these cost?

38. $\frac{1}{4}$ of the 84 children in a school are in room A, $\frac{1}{4}$ are in room B, and the rest are in room C. How many are there in each room?

39. I am reading a story 87 pages long. I read $\frac{1}{3}$ of it yesterday and 22 pages this morning. How many pages have I read? How many have I not read?

GENERAL REVIEW

ORAL EXERCISES

1. For how many units does 1 in tens' place stand?
2 in tens' place? 5 in tens' place? 6? 8? 9?

2. How many tens and how many units besides are
there in 17? In 33? In 61? In 92? In 48? In 20?

Read:

3. XL.	5. XX.	7. XXIX.	9. L.
4. XVI.	6. XXXI.	8. XLV.	10. XXII.

Add:

11. 7	12. 4	13. 2	14. 3	15. 9	16. 7
9	1	6	7	3	7
2	7	9	5	8	3
4	6	1	2	7	8
5	9	4	9	6	5
<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>

Subtract:

17. 17	18. 24	19. 31	20. 50	21. 23	22. 47
9	8	5	17	9	18
<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>

Read, and fill the blanks:

23. 10 dimes = () nickels. 10 dimes = () cents.

24. 1 ft. = () in. 1 yd. = () ft. 1 sq. yd. = () sq. ft.

25. 1 qt. = () pt. 1 gal. = () qt. 1 gal. = () pt.

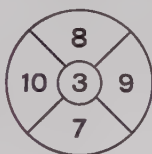
26. 1 pk. = () qt. 1 bu. = () qt. 1 bu. = () pk.

Multiply the outer numbers by the number in the center :

27.



28.



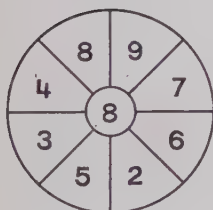
29.



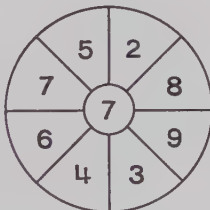
30.



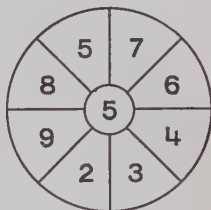
31.



32.

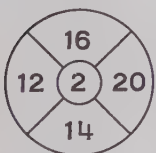


33.



Divide the outer numbers by the number in the center :

34.



35.



36.

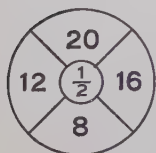


37.

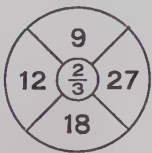


Find the part of each outer number shown by the fraction in the center :

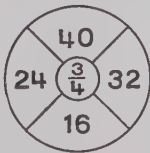
38.



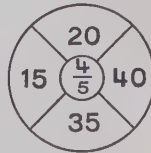
39.



40.



41.



Read, and fill the blanks:

42. $8 \times 4 = ()$. $8 = () \times 4$. $5 \times () = 20$.

43. $9 \times 4 = ()$. $35 = () \times 5$. $7 \times () = 28$.

44. $8 \times 3 = ()$. $27 = () \times 3$. $10 \times () = 30$.

45. $24 = ()$ 3's. $18 = ()$ 3's. $21 = ()$ 3's.

46. $45 = ()$ 5's. $28 = ()$ 4's. $30 = ()$ 5's.

Solve:

47. How many multiples of 2 are there between 1 and 21? Between 39 and 51?

48. How many school days are there in 2 weeks? In 4 weeks? In 6 weeks? In 9 weeks?

49. Find $\frac{1}{5}$ of the school days in 2 weeks. $\frac{2}{5}$ of the school days in two weeks. $\frac{3}{5}$ of them. $\frac{4}{5}$ of them.

50. There are 2 doz. and $\frac{3}{4}$ of a doz. bars of soap left in a box. How many bars are there?

51. George bought 15 qt. of berries at 4 cts. a qt. and sold them at 5 cts. a qt. How much did he gain? What is the shortest way to find this?

52. How many inches are there in a foot? How many 6-inch lengths are there in a foot? How many 3-inch lengths? How many 4-inch lengths?

53. How many feet in a yard? In $\frac{1}{3}$ of a yd.? In $\frac{2}{3}$ of a yd.?

54. How many inches are there in $\frac{1}{3}$ of a yd.?

55. How many square feet in one square yard? In $\frac{2}{3}$ of a square yard?

56. How many inches on an edge is a 2-inch cube? How many square inches in each face of this cube?

WRITTEN EXERCISES

Add the numbers in each column and add the results.

Add the numbers in each row and add the results:

1. $3 + 3 + 3 + 3 + 3 + 3$. 2. $1 + 2 + 3 + 4 + 5 + 6$.
 $7 + 3 + 6 + 1 + 2 + 3$. $2 + 1 + 3 + 5 + 4 + 6$.
 $4 + 4 + 4 + 4 + 4 + 4$. $5 + 4 + 3 + 2 + 1 + 0$.

Add:

3. 13	5. 18	7. 20	9. 41	11. 57	13. 32
21	19	11	9	8	17
17	40	36	13	6	19
<u>35</u>	<u>16</u>	<u>15</u>	<u>28</u>	<u>19</u>	<u>20</u>
4. 24	6. 47	8. 32	10. 26	12. 41	14. 14
30	19	21	13	15	9
8	10	19	31	29	28
<u>12</u>	<u>18</u>	<u>15</u>	<u>23</u>	<u>11</u>	<u>16</u>

Subtract:

15. 97	18. 85	21. 79	24. 60	27. 58	30. 94
<u>63</u>	<u>16</u>	<u>30</u>	<u>47</u>	<u>29</u>	<u>36</u>
16. 96	19. 75	22. 47	25. 52	28. 38	31. 67
<u>43</u>	<u>56</u>	<u>28</u>	<u>13</u>	<u>29</u>	<u>18</u>
17. 100	20. 100	23. 53	26. 96	29. 62	32. 63
<u>23</u>	<u>69</u>	<u>26</u>	<u>47</u>	<u>19</u>	<u>14</u>

Multiply:

33. 34	34. 28	35. 17	36. 19	37. 20	38. 36
<u>3</u>	<u>2</u>	<u>4</u>	<u>5</u>	<u>4</u>	<u>2</u>

Divide :

39. $3\overline{)48}$

40. $5\overline{)60}$

41. $2\overline{)75}$

42. $4\overline{)56}$

43. $3\overline{)84}$

Solve :

44. The following are ways of earning money :

25¢ for mowing a lawn.

25¢ for weeding a garden-bed.

5¢ for tending a furnace.

15¢ for cleaning a walk.

10¢ for blacking a pair of shoes.

5¢ for running an errand.

10¢ for washing the dishes.

10¢ for hemming a towel.

According to the table, how much does a boy earn who mows a lawn once and weeds a garden-bed 3 times ?

45. What is it worth to tend a furnace twice a day for a week and to clean a walk twice ?

46. James blacked shoes. How much did he receive from 9 customers ?

47. Mary runs 7 errands in a week and washes the dishes 6 times. How much does she earn in a week ?

48. Elsie hemmed 4 towels and weeded a garden-bed. How much did she earn ?

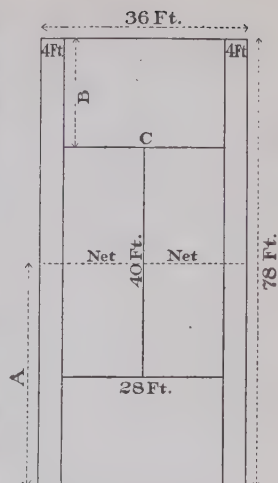
49. Julia bought 6 dolls at 5 cts. each and 1 yd. of muslin for 15 cts. How much did she pay for these ?

50. She dressed the dolls and sold them for 15 cts. each. How much did 2 dolls bring ? 4 ? 6 ?

51. How much did Julia make ?

52. Lucy bought 3 lb. of sugar at 5 cts. a lb., 1 qt. of milk for 5 cts., and other things for 10 cts. How much change did she receive out of a dollar ?

53. James is marking out a tennis court 78 ft. long by 36 ft. wide. If the space is measured off as shown in the picture, how many feet is the distance A? The distance B?



54. How far is it from the net to the outer end of the court? How far is it from the net to the line C?

55. $\frac{3}{4}$ of a fence 48 ft. long has been painted. How many yards are still unpainted?

56. How many pint bottles can be filled from 3 gal. of milk? How much is the milk worth at 4 cts. a pt.?

57. If, going to and from school in the steam cars, I travel altogether 9 mi. a day at 2 cts. a mi., how much carfare do I spend in a week?

58. What is the cost of:

3 bars of soap at 5 cts. a bar.....	15 cts.
2 lb. of crackers at 8 cts. a lb.....	16 "
5 lb. of sugar at 5 cts. a lb.	25 "
	() cts.

What would be the change out of 75 cents?

59. What is the cost of:

$\frac{1}{2}$ bu. of potatoes at 60 cts. a bu.....	30 cts.
1 sack of salt at 10 cts.....	10 "
1 package of yeast-cakes at 8 cts.....	8 "
	() cts.

What would be the change out of 50 cents?

60. What did Carl pay for 4 qt. of berries at 10 cts. a qt. and 1 lb. of butter at 19 cts.?

61. What change had he left out of 75 cts.?

62. What is the cost of 2 doz. eggs at 18 cts. a doz. and 2 packages of cereal at 12 cts. each?

63. A bushel of strawberries was put into quart baskets. How many baskets were there?

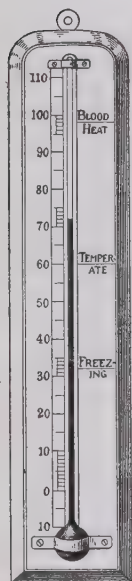
64. A bushel of blueberries was put into half-peck measures. How many measures were there?

65. When milk is 5 cts. a qt., and cream 20 cts. a qt., how many quarts of milk is one quart of cream worth?

66. How many days from Washington's Birthday in 1909 until the Fourth of July, counting both these days?

67. Read the temperature as shown by the thermometer in the picture.

68. Read from the table the lowest temperature for each day, and find the difference between it and each of the other temperatures for that day.



HOURL	TEMPERATURE				
	<i>Monday</i>	<i>Tuesday</i>	<i>Wednesday</i>	<i>Thursday</i>	<i>Friday</i>
9 o'clock.....	60°	61°	70°	75°	64°
12 o'clock.....	78°	74°	84°	90°	75°
2 o'clock.....	83°	79°	90°	90°	78°
4 o'clock.....	81°	73°	83°	85°	71°

CHAPTER III

NOTATION AND NUMERATION

Units, Tens, and Hundreds

73. PREPARATORY.

1. How many squares are there in Figure 1? How many in Figure 2? How many in Figure 3?



FIG. 1.



FIG. 2.

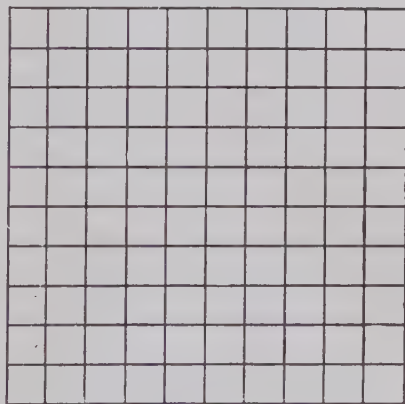


FIG. 3.

2. Call Figure 1 one. What shall we call Figure 2? Figure 3?

3. How many columns of ten squares each are there in Figure 3?

4. One ten is how many units? One hundred is how many tens? One hundred is how many units?

5. How many hundred are one hundred and one hundred? Write two hundred in figures.

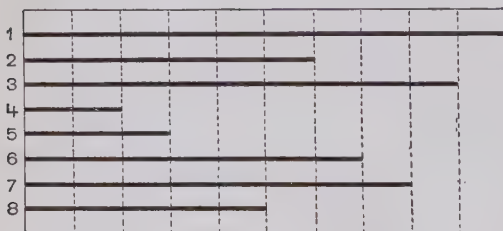
6. How many hundred are two hundred and one hundred? Write three hundred in figures.

7. How many are 9 hundred and 1 hundred? Write the number.

74. Ten hundred is called *one thousand* and written in figures 1,000.

ORAL EXERCISES

1. Count from 100 to 112. From 205 to 220. From 400 to 415. From 760 to 775. From 985 to 1,000. From 610 back to 590. From 315 back to 295.



2. Count by tens from 100 to 200. From 380 to 450. From 570 to 630. From 920 to 1,000.

3. If the first line in the diagram stands for 1,000, for what does the next line stand? The 3d? The 4th? The 5th? The 6th? 7th? 8th?

Place Value

75. PREPARATORY.

1. In 100 what does the naught at the right show? What does the next naught show? What does the 1 show? How many places are there in 100?

2. Write four hundred. Which is the third place? What does the figure in the units' place show? The figure in the second place? In the first place?

76. In any whole number, the first three places, counting from the right, are **units' place, tens' place, hundreds' place.**

ORAL EXERCISES

1. Read the first line in the table. How many hundreds are there? How many tens? How many units?

HUNDREDS	TENS	UNITS	
200	and 10	and 9	= 2 1 9
300	" 10	" 8	= 3 1 8
400	" 20	" 7	= 4 2 7
500	" 10	" 6	= 5 1 6
600	" 20	" 5	= 6 2 5
700	" 20	" 4	= 7 2 4
800	" 10	" 3	= 8 1 3
900	" 10	" 2	= 9 1 2

2. In which place, counting from the right, are the units? In which place is the ten? In which are the hundreds? What number do these make?

3. Answer the questions of Exercises 1 and 2 for each of the remaining numbers in the table.

WRITTEN EXERCISES

Write in figures the number that is the sum of:

1. 7 units, 8 tens, 9 hundreds.
2. 4 tens, 7 hundreds, 3 units.
3. 6 hundreds, no tens, 5 units.
4. 9 hundreds, 2 units, no tens.
5. 8 tens, no units, 5 hundreds.
6. No units, no tens, ten hundreds.

United States Money

77. PREPARATORY.

1. What are the common silver coins of the United States? What is the value of each?

2. What is the name of the bronze coin? The nickel coin? How much is each worth?

3. Name two coins the sum of whose values is 75 cents. Name a set of coins the sum of whose values is 35 cents. 45 cents. 90 cents.

4. Write 8 cents in a shorter form. Write 5 dollars in a shorter form.

78. Dollars and cents together, as, for example, 8 dollars and 35 cents, is written thus: \$8.35.

That is, we write the number of dollars, 8; then a period; then the number of cents, 35; then a dollar sign before the whole number.

35 cents may be written either 35¢ or \$.35.

8 dollars and 5 cents may be written \$8.05.

5 cents may be written either 5¢ or \$.05.

The figures at the right of the period stand for cents; those at the left of the period stand for dollars.

ORAL EXERCISES

Read:

- | | | | |
|-------------|--------------|---------------|---------------|
| 1. \$1.25. | 5. \$3.09. | 9. \$.07. | 13. \$10.00. |
| 2. \$4.32. | 6. \$11.06. | 10. \$800.65. | 14. \$15.05. |
| 3. \$5.50. | 7. \$25.01. | 11. \$.44. | 15. \$.50. |
| 4. \$10.40. | 8. \$270.00. | 12. \$444.04. | 16. \$150.00. |

17. Read 25ϕ . \$.25. What coin expresses this amount?

18. Read 75ϕ . \$.75. What coins equal this amount?

19. Read 125ϕ . \$1.25. What coins equal this amount?

20. Read 5ϕ . \$.05. What coin expresses this amount?

21. Read the following and name coins to express each amount: \$5.45; \$7.30; \$15.50; \$27.65; \$25.35.

79. The period used to separate the number of dollars from the number of cents is called the **decimal point**.

WRITTEN EXERCISES

Write, using the decimal point:

1. Sixty-five cents. One dollar and sixty cents.
2. Ten dollars and forty-five cents. Fifty-five dollars and five cents.
3. Thirteen dollars and fifty cents.
4. Eighteen dollars and nine cents.
5. Twenty-five dollars and sixty-three cents.
6. One hundred dollars and seventy-five cents.
7. 1 dollar and 25 cents. 3 dollars and 35 cents.
8. 5 dollars, 4 dimes, and 5 cents. 1 dollar and 5 cents.
9. 5 dollars and 45 cents. 10 dollars and 75 cents.
10. 5 dollars and 84 cents. 17 dollars and 15 cents.
11. 30 dollars and 5 cents. 16 dollars and 90 cents.

MAKING CHANGE

80. If Carl buys a book for 18 cts. and hands the clerk a quarter, the clerk probably counts out the change in this way:

He thinks "18 plus 2 plus 5 is 25," and says aloud: "Eighteen, twenty, twenty-five," as he hands Carl two 1-cent pieces and a 5-cent piece.

Of course, the change may be made in different ways. Thus, instead of returning a dime, the clerk may return two 5-cent pieces. But, if the coins are sorted in the till, he generally makes it in the simplest way.

ORAL EXERCISES

1. Clara bought calico for 35 cts., and gave the clerk a half-dollar. What coins did she receive?

Count the change from 1 dollar for:

- | | |
|-------------------------------|--------------------------------|
| 2. A 55-cent purchase. | 5. An 80-cent purchase. |
| 3. A 78-cent purchase. | 6. A 77-cent purchase. |
| 4. A 56-cent purchase. | 7. An 89-cent purchase. |

Count the change in each case:

AMOUNT GIVEN PURCHASE CHANGE			AMOUNT GIVEN PURCHASE CHANGE		
8.	50¢	27¢	()	10.	75¢ 54¢ ()
9.	25¢	13¢	()	11.	\$1.50 \$1.25 ()

WRITTEN EXERCISES

Using the decimal point, write the amounts of change in Exercises 2 to 7 above. Write the results in Exercises 8 to 11 above.

Roman Notation

81. $50 + 10 = 60.$ $L + X = LX.$

Write the Roman numbers needed to fill the blanks in the following:

$50 + 10 + 10 = 70.$ $L + X + X = (\quad).$

$50 + 10 + 10 + 10 = 80.$ $L + X + X + X = (\quad).$

82. One hundred is written C. Ninety, or 10 less than 100, is written XC.

ORAL EXERCISES

Read:

1. LVI	2. LXVII	3. LXXX	4. XCV
LIX	LXXXI	LXXI	XCIX
LIV	LXXII	LXIX	LXXIX

Give in Roman numerals:

5. 54	6. 64	7. 71	8. 98	9. 66
83	92	59	55	91
49	89	100	36	45

WRITTEN EXERCISES

Write in Roman numerals:

1. 53 100 47 84 66 79 43 94 99

2. The numbers in order from 89 to 100. From 49 to 61.

3. The multiples of 10 from 10 to 100.

4. All the different symbols of Roman notation you have learned. Give the corresponding Arabic number for each.

ADDITION

83. EXAMPLE: A school yard has on one side a walk 196 ft. long and on another side a walk 233 ft. long. How many feet long are the two walks?

Add 196 ft. and 233 ft.

196	3 units + 6 units = 9 units.
233	3 tens + 9 tens = 12 tens, or 1 hundred + 2 tens.
<u>429</u>	1 hundred + 2 hundred + 1 hundred = 4 hundred.
	196 ft. and 233 ft. are 429 ft.

The two walks are 429 ft. long.

WRITTEN EXERCISES

Add :

1. 324	5. 438	9. 678	13. 234	17. 179
122	341	201	564	210
<u>446</u>	<u>779</u>	<u>879</u>	<u>798</u>	<u>389</u>
2. 312	6. 415	10. 333	14. 444	18. 347
532	432	666	222	389
<u>844</u>	<u>847</u>	<u>1332</u>	<u>444</u>	<u>736</u>
3. 463	7. 517	11. 720	15. 811	19. 723
487	326	186	115	265
<u>950</u>	<u>843</u>	<u>906</u>	<u>926</u>	<u>988</u>
4. 189	8. 567	12. 801	16. 635	20. 459
93	376	199	289	308
<u>282</u>	<u>943</u>	<u>999</u>	<u>924</u>	<u>767</u>

Solve :

21. There are 438 children in one school, and 341 in another. How many are there in both schools?

22. A school building is 122 ft. wide and 224 ft. long. What is the number of feet in the sum of these sides? What is the distance around the building?

23. From the following table tell how many pupils are in the first two primary grades.

PRIMARY GRADES	PUPILS	GRAMMAR GRADES	PUPILS
First.....	200	Fifth.....	160
Second.....	196	Sixth.....	125
Third.....	191	Seventh.....	93
Fourth.....	175	Eighth.....	88

24. How many pupils in the third and fourth grades together?

25. How many in the first three primary grades?

26. How many pupils in the fifth and sixth grades?

27. Find the number of pupils in all of the primary grades. All of the grammar grades. In the second, third, and fourth grades. In the third, fourth, and fifth.

84. EXAMPLE: An overcoat for Charles costs \$4.75, and a suit of clothes \$5.50. What is the cost of both?

Add \$4.75 and \$5.50.

$$\begin{array}{r}
 \$4.75 \\
 5.50 \\
 \hline
 \$10.25
 \end{array}
 \begin{array}{l}
 5\phi + 0\phi = 5\phi. \\
 5 \text{ dimes} + 7 \text{ dimes} = 12 \text{ dimes, or } \$1 \text{ and } 2 \\
 \text{dimes.} \\
 \$1 + \$5 + \$4 = \$10.
 \end{array}$$

The overcoat and suit cost \$10.25.

WRITTEN EXERCISES

Add:

1. \$165.75	3. \$18.60	5. \$189.25	7. \$133.33
149.75	19.35	96.15	66.67
<hr/>	<hr/>	<hr/>	<hr/>
2. \$100.25	4. \$568.23	6. \$633.25	8. \$810.60
800.75	20.07	99.45	184.30
<hr/>	<hr/>	<hr/>	<hr/>

9. \$255.20	10. \$110.38	11. \$13.25	12. \$400.15
365.37	269.15	76.35	333.75
<u>110.08</u>	<u>106.19</u>	<u>700.00</u>	<u>88.99</u>

13. Make and solve ten addition exercises.

Solve:

14. Susie has a jacket that cost \$3.65 and a dress that cost \$4.25. How much did both cost?

15. Ralph earned \$16.25 in four months and \$3.75 the fifth month. How much did he earn in all?

16. A grocer received from customers \$4.46 in one hour and \$5.23 the next. How many dollars did he receive in the two hours?

17. The desks in a room cost \$85.50 and the pictures \$8.75. What did they both cost?

18. Following is the cost of some schoolroom furniture:

Chair.....	\$5.75	Dictionary ..	\$11.00	Chart	\$6.75
Desk	20.50	Table.....	8.25	Map.....	3.80

What did the chair and desk together cost, as given in the table?

19. What did the desk and table together cost?

Find the total cost of each of the following orders:

20. Chair	22. Chair	24. Dictionary	26. Map
Chart	Chart	Chart	Chart
Desk			Chair
21. Chart	23. Desk	25. Dictionary	27. Table
Map	Map	Map	Map

SUBTRACTION

85. EXAMPLE: A grade of 304 pupils was separated into two parts, of which one had 186 pupils. How many had the other?

Take 186 from 304.

In 304, there are no tens in tens' place; hence, in order to get 14 from which to take 6, we take 1 hundred, or 10 tens, from the 3 hundreds, and use one of these tens with the four units.

304

186

118

Then, 8 tens from 9 tens is 1 ten, and 1 hundred from 2 hundred is 1 hundred. Or, we think "6 and 8 are 14" and write 8. Having used ten

for the first column, we think "8 tens and 1 ten are 9 tens," and write 1 in tens' place. Then "1 hundred and 1 hundred are 2 hundreds," and write 1 in hundreds' place.

The other part had 118 pupils.

WRITTEN EXERCISES

Subtract:

- | | | | | |
|------------|------------|------------|------------|------------|
| 1. 1000 | 4. 888 | 7. 762 | 10. 725 | 13. 942 |
| <u>123</u> | <u>299</u> | <u>438</u> | <u>296</u> | <u>471</u> |
| 2. 1000 | 5. 1000 | 8. 707 | 11. 536 | 14. 812 |
| <u>777</u> | <u>456</u> | <u>638</u> | <u>285</u> | <u>309</u> |
| 3. 632 | 6. 899 | 9. 1000 | 12. 806 | 15. 514 |
| <u>245</u> | <u>196</u> | <u>999</u> | <u>295</u> | <u>19</u> |

Solve:

16. In a school of 305 pupils, 269 are girls. How many boys are there?

17. 568 new books were bought, and 379 were used. How many were not used?

18. Mary went 405 miles on a visit. When she was 209 miles from home, how far had she yet to go?

19. A train carrying 805 passengers let off 267 at a station. How many remained on this train?

20. Rose has read 83 pages of a 212-page book. How many pages has she yet to read?

86. EXAMPLE: A family's expenses for one week were \$13.24; their meat bill was \$2.26. How much did they pay for other things?

Take \$2.26 from \$13.24.

\$13.24 6 from 14 is 8. 2 from 11 is 9. 2 from 12 is 10.
 Or,

 2.26 6 cts. + 8 cts. = 14 cts. Write 8.
\$10.98 2 dimes + 9 dimes = 11 dimes. Write 9.
 \$2 + \$10 = \$12. Write 10.

Test: \$10.98 + \$2.26 = \$13.24.

The family paid \$10.98 for other things.

WRITTEN EXERCISES

Subtract:

1. \$9.86 2.99 <u> </u>	4. \$10.00 3.44 <u> </u>	7. \$11.63 2.05 <u> </u>	10. \$100.00 45.86 <u> </u>
2. \$25.00 6.73 <u> </u>	5. \$84.51 69.90 <u> </u>	8. \$10.06 3.09 <u> </u>	11. \$99.88 12.34 <u> </u>
3. \$18.67 9.88 <u> </u>	6. \$42.63 9.99 <u> </u>	9. \$12.15 11.78 <u> </u>	12. \$80.09 33.68 <u> </u>

13. \$54.80 <u>14.69</u>	15. \$15.75 <u>9.95</u>	17. \$40.23 <u>8.06</u>	19. \$100.00 <u>80.09</u>
14. \$18.75 <u>9.43</u>	16. \$86.15 <u>49.25</u>	18. \$199.03 <u>86.66</u>	20. \$720.05 <u>194.77</u>

Solve :

21. A man spent \$136.25 during one year in repairing a house that rents for \$285 a year. How much had he left out of a year's rent?

22. A tailor earned \$135.50 in one month; his expenses were \$95.75. How much had he left?

23. A farmer had a grocery bill of \$17.36 and paid \$12.75. How many dollars did he still owe?

24. A farmer received \$17.50 worth of groceries and gave the grocer in payment \$9.75 worth of butter and the rest in money. How much money did he pay the grocer?

25. A man bought a bill of goods amounting to \$7.25 and gave the clerk a 10-dollar bill. How much change did he receive?

26. A grocer buys a cheese for \$2.50, a barrel of sugar for \$6.50, and a box of soap for \$3.75; he pays the bill with \$15. How much change does he receive?

27. In a certain store the sales for one day at the silk counter amounted to \$85.65, and at the lining counter to \$40.65 less than at the silk counter. How much was received at both counters?

28. A clerk earned \$85.50 in a month and spent \$49.75. How many dollars had he left?

REVIEW AND PRACTICE

WRITTEN EXERCISES

Write in Roman notation :

1. 85	60	59	27	40
2. 25	15	100	89	98

Add :

3. 127 <u>239</u>	5. 625 <u>236</u>	7. 435 <u>229</u>	9. 760 <u>143</u>	11. 229 <u>307</u>
4. 347 <u>423</u>	6. 180 <u>719</u>	8. 658 <u>27</u>	10. 845 <u>35</u>	12. 525 <u>165</u>
13. \$32.84 <u>79.08</u>	15. \$158.97 <u>39.50</u>	17. \$150.00 <u>320.80</u>	19. \$425.50 <u>574.50</u>	
14. \$87.60 <u>13.25</u>	16. \$465.65 <u>25.00</u>	18. \$652.45 <u>218.56</u>	20. \$ 92.88 <u>275.35</u>	

Subtract :

21. 132 <u>29</u>	23. 126 <u>95</u>	25. 245 <u>23</u>	27. 359 <u>86</u>	29. 189 <u>171</u>
22. 144 <u>39</u>	24. 599 <u>129</u>	26. 573 <u>386</u>	28. 667 <u>548</u>	30. 259 <u>130</u>
31. \$1,000.00 <u>850.50</u>	33. \$999.80 <u>189.90</u>	35. \$137.20 <u>29.50</u>	37. \$149.40 <u>18.67</u>	
32. \$100.27 <u>33.33</u>	34. \$500.33 <u>99.99</u>	36. \$200.25 <u>44.76</u>	38. \$325.70 <u>95.49</u>	

Solve:

39. Add 10 to 825. 30 to 825. 50 to 735. 60 to 423.

40. 645 is how many more than 535? Than 515?

41. The following are the great canals of the world with their lengths:

Imperial (China).....	1,000 mi.	Caledonia (Scotland)	60 mi.
Ganges (India) about.	355 "	Suez (Egypt).....	88 "
North Holland.....	51 "	Erie (New York)...	350 "
Ohio.....	332 "	Panama	46 "

Which of these canals is the longest? The shortest?

42. The Imperial Canal is how many miles longer than the next longest?

43. The Imperial Canal is how many miles longer than the North Holland?

44. The Ganges Canal is how many miles longer than the Erie of New York?

45. Of all these canals, how many miles are in Europe? How many in the United States?

46. The publishers of a magazine gave the following prizes for stories: 1st prize, \$100; 2d, \$50; 3d, \$25; 4th, \$10. What was the whole amount given?

47. Of the three cases of books in a library, one contains 146 books, another 280, and the other 198. How many books do they all contain?

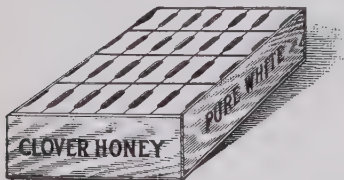
48. The Eiffel Tower in Paris is 984 ft. high, and the Washington Monument 555 ft. high. What is the difference in their heights?

MULTIPLICATION AND DIVISION

Multiplying by Six

87. PREPARATORY.

1. How many cards of honey in the first short row in this box?



2. How many in the second row?

3. 2 times 6 cards are how many cards?

4. How many are there in the third row? In three rows?

5. 3 times 6 cards are how many cards?

6. 4 times 6 cards are how many cards?

7. Make 10 rows of 6 dots each. How many dots are there in the first 2 rows?

$$3 \times 6 \text{ dots} = () \text{ dots?}$$

$$2 \times 6 \text{ dots} = () \text{ dots?}$$

$$8 \times 6 \text{ dots} = () \text{ dots?}$$

$$4 \times 6 \text{ dots} = () \text{ dots?}$$

$$7 \times 6 \text{ dots} = () \text{ dots?}$$

$$9 \times 6 \text{ dots} = () \text{ dots?}$$

$$5 \times 6 \text{ dots} = () \text{ dots?}$$

$$10 \times 6 \text{ dots} = () \text{ dots?}$$

TABLE

$1 \times 6 = 6$	$6 \times 6 = 36$
$2 \times 6 = 12$	$7 \times 6 = 42$
$3 \times 6 = 18$	$8 \times 6 = 48$
$4 \times 6 = 24$	$9 \times 6 = 54$
$5 \times 6 = 30$	$10 \times 6 = 60$

ORAL EXERCISES

Read, and supply the missing numbers :

1. $6 \times () = 6.$

6. $6 \times () = 36.$

2. $6 \times () = 12.$

7. $6 \times () = 42.$

3. $6 \times () = 18.$

8. $6 \times () = 48.$

4. $6 \times () = 24.$

9. $6 \times () = 54.$

5. $6 \times () = 30.$

10. $6 \times () = 60.$

Multiply :

11. $\begin{array}{r} 6 \\ 8 \\ \hline \end{array}$

12. $\begin{array}{r} 8 \\ 6 \\ \hline \end{array}$

13. $\begin{array}{r} 6 \\ 5 \\ \hline \end{array}$

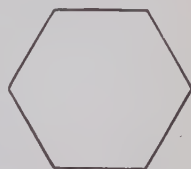
14. $\begin{array}{r} 5 \\ 6 \\ \hline \end{array}$

15. $\begin{array}{r} 6 \\ 9 \\ \hline \end{array}$

16. $\begin{array}{r} 9 \\ 6 \\ \hline \end{array}$

17. How many sides has this hexagon?

18. If each side of a hexagon is 1 in. long, what is the sum of its sides? What is the sum, if each side is 3 in. long? 2 in. long? 6 in. long? 7 in. long? 5 in. long? 4 in. long? 8 in. long? 9 in. long?



HEXAGON

19. How many working days are there in 6 weeks? In 10 weeks? In 8 weeks?

20. A bee has 6 legs, and a food pouch on each leg. How many food pouches have 8 bees? 5 bees?

21. Count by 6's to 60, and write the multiples as you count.

22. Count by 6's from 60 to 102, and write the multiples as you count.

23. A glove maker shipped 9 boxes of gloves, each containing half a dozen pairs. How many pairs did he ship?

WRITTEN EXERCISES

Copy and multiply :

1. 15 <u>6</u>	4. 95 <u>6</u>	7. 37 <u>6</u>	10. 66 <u>6</u>	13. 28 <u>6</u>	16. 56 <u>6</u>
2. 39 <u>6</u>	5. 19 <u>6</u>	8. 84 <u>6</u>	11. 43 <u>6</u>	14. 75 <u>6</u>	17. 64 <u>6</u>
3. 23 <u>6</u>	6. 53 <u>6</u>	9. 24 <u>6</u>	12. 31 <u>6</u>	15. 92 <u>6</u>	18. 97 <u>6</u>

Solve :

19. What is the cost of 6 yd. of lawn at 18 cts. a yd.?
20. What is the cost of 6 yd. of cloth at 42 cts. a yd.?
21. How many cans of fruit in 100 boxes of 6 cans each? In 125 of these boxes? In 96 boxes?
22. When a fence is 6 ft. between posts, how long is a fence having 85 such lengths?
23. How many yards in 6 spools of tape, each containing 2 doz. yd.?
24. 6 pupils planted 48 beans each. How many did they all plant?
25. A motor boat used 24 qt. of gasoline a day. How many quarts did it use in 6 days?
26. When we say water is a fathom deep, we mean 6 ft. deep. How many feet deep is a lake 63 fathoms deep?
27. When soap is packed in boxes of $\frac{1}{2}$ doz. cakes each, how many cakes of soap in 144 boxes?

Dividing by Six

TABLE

$6 \div 6 = 1$	$36 \div 6 = 6$
$12 \div 6 = 2$	$42 \div 6 = 7$
$18 \div 6 = 3$	$48 \div 6 = 8$
$24 \div 6 = 4$	$54 \div 6 = 9$
$30 \div 6 = 5$	$60 \div 6 = 10$

ORAL EXERCISES

Read, and supply the missing numbers:

1. $6 \div (7) = 6.$

6. $36 \div () = 6.$

2. $12 \div (2) = 6.$

7. $42 \div () = 6.$

3. $18 \div (3) = 6.$

8. $48 \div () = 6.$

4. $24 \div (4) = 6.$

9. $54 \div () = 6.$

5. $30 \div (5) = 6.$

10. $60 \div () = 6.$

Find $\frac{1}{6}$ of:

11. 42

12. 18

13. 54

14. 30

15. 60

16. 24

Solve:

17. Mary erased $\frac{1}{6}$ of 54 words. How many did she erase?

18. Henry planted 42 flower seeds, and $\frac{1}{6}$ of them failed to come up. How many came up?

19. How many 6's are there in 36? In 48? In 54? In 24? In 42?

20. How many 6's, and how many 1's over in 55? In 44? 33? 61? 19? 37? 50? 35? 26?

WRITTEN EXERCISES

Copy and fill the blanks:

1. $60 \div 6 = (\quad)$. 4. $42 \div 6 = (\quad)$. 7. $54 \div 6 = (\quad)$.
 2. $36 \div 6 = (\quad)$. 5. $48 \div 6 = (\quad)$. 8. $30 \div 6 = (\quad)$.
 3. $24 \div 6 = (\quad)$. 6. $12 \div 6 = (\quad)$. 9. $18 \div 6 = (\quad)$.

Copy and divide:

10. $6 \overline{)48}$ 15. $6 \overline{)30}$ 20. $6 \overline{)144}$ 25. $6 \overline{)432}$

11. $6 \overline{)24}$ 16. $6 \overline{)42}$ 21. $6 \overline{)150}$ 26. $6 \overline{)846}$

12. $6 \overline{)90}$ 17. $6 \overline{)18}$ 22. $6 \overline{)396}$ 27. $6 \overline{)318}$

13. $6 \overline{)60}$ 18. $6 \overline{)54}$ 23. $6 \overline{)720}$ 28. $6 \overline{)252}$

14. $6 \overline{)36}$ 19. $6 \overline{)114}$ 24. $6 \overline{)210}$ 29. $6 \overline{)486}$

30. Find $\frac{5}{6}$ of 90. Of 108. Of 114. Of 144. Of 210. Of 150. Of 300. Of 318. Of 432.

Solve:

31. Manley had a vacation of 114 days, of which $\frac{1}{6}$ were rainy. How many were rainy? How many were fair?

32. A class planted 96 flower seeds, $\frac{5}{6}$ of which came up. How many came up? How many did not?

33. Carl earned 84 cents and spent $\frac{1}{6}$ of it. How many cents did he spend? How many did he save?

34. 144 eggs were packed in boxes containing $\frac{1}{2}$ doz. each. How many boxes were used?

35. In a parade the men marched in rows of 6; there were 960 men. How many rows were there?

Multiplying by Seven

88. PREPARATORY.

1. How many days in a full week? In 2 weeks?

1909		DECEMBER				1909
S.	M.	T.	W.	T.	F.	S.
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

2. What day of the week is the seventh day of December, 1909? What is the date of the Tuesday following? Of the next Tuesday? Of the next?

3. Read the numbers in the third column of the calendar. How many sevens in the first number? The second? The third? The fourth?

4. Count by 7's from 7 to 70. Write these numbers.

TABLE

$1 \times 7 = 7$	$6 \times 7 = 42$
$2 \times 7 = 14$	$7 \times 7 = 49$
$3 \times 7 = 21$	$8 \times 7 = 56$
$4 \times 7 = 28$	$9 \times 7 = 63$
$5 \times 7 = 35$	$10 \times 7 = 70$

ORAL EXERCISES

Read, and supply the missing numbers :

1. $7 \times () = 7.$

6. $7 \times () = 42.$

2. $7 \times () = 14.$

7. $7 \times () = 49.$

3. $7 \times () = 21.$

8. $7 \times () = 56.$

4. $7 \times () = 28.$

9. $7 \times () = 63.$

5. $7 \times () = 35.$

10. $7 \times () = 70.$

Multiply :

$$\begin{array}{r} 11. \quad 8 \qquad 7 \qquad 9 \\ \quad 7 \qquad 7 \qquad 7 \\ \hline \end{array}$$

$$\begin{array}{r} 12. \quad 5 \qquad 6 \qquad 4 \\ \quad 7 \qquad 7 \qquad 7 \\ \hline \end{array}$$

Solve :

13. How much will 2 yd. of calico cost at 7 cts. a yd. ?
How much will 3 yd. cost ? 4 yd. ? 6 yd. ? 5 yd. ?

14. How much will 3 yd. of ribbon cost at 7 cts. a yd. ?
How much will 5 yd. cost ? 9 yd. ? 8 yd. ?

15. Mark bought flags for 7 cts. each. How much would he have to pay for 5 flags ? 3 flags ? 8 flags ?
10 flags ? 4 flags ?

WRITTEN EXERCISES

Copy and multiply :

$$\begin{array}{r} 1. \quad 116 \\ \quad 7 \\ \hline \end{array}$$

$$\begin{array}{r} 4. \quad 93 \\ \quad 7 \\ \hline \end{array}$$

$$\begin{array}{r} 7. \quad 140 \\ \quad 7 \\ \hline \end{array}$$

$$\begin{array}{r} 10. \quad 99 \\ \quad 7 \\ \hline \end{array}$$

$$\begin{array}{r} 13. \quad 89 \\ \quad 7 \\ \hline \end{array}$$

$$\begin{array}{r} 2. \quad 129 \\ \quad 7 \\ \hline \end{array}$$

$$\begin{array}{r} 5. \quad 125 \\ \quad 7 \\ \hline \end{array}$$

$$\begin{array}{r} 8. \quad 102 \\ \quad 7 \\ \hline \end{array}$$

$$\begin{array}{r} 11. \quad 124 \\ \quad 7 \\ \hline \end{array}$$

$$\begin{array}{r} 14. \quad 77 \\ \quad 7 \\ \hline \end{array}$$

$$\begin{array}{r} 3. \quad 96 \\ \quad 7 \\ \hline \end{array}$$

$$\begin{array}{r} 6. \quad 47 \\ \quad 7 \\ \hline \end{array}$$

$$\begin{array}{r} 9. \quad 135 \\ \quad 7 \\ \hline \end{array}$$

$$\begin{array}{r} 12. \quad 111 \\ \quad 7 \\ \hline \end{array}$$

$$\begin{array}{r} 15. \quad 85 \\ \quad 7 \\ \hline \end{array}$$

Solve:

16. What is the cost of 7 yd. of silk at 85 cts. a yd.?

17. If a train runs 36 mi. an hour, how many miles will it travel in 7 hr.?

18. A ferry boat ran 7 mi. on each trip. How many miles did it run on 84 trips?

19. If the current of a river is 7 mi. an hour, how far will it carry a piece of wood in 75 hr.?

20. How many days in 52 weeks? In 26 weeks?

21. How many days in 104 weeks? In 130 weeks?

Dividing by Seven

TABLE

$7 \div 7 = 1$	$42 \div 7 = 6$
$14 \div 7 = 2$	$49 \div 7 = 7$
$21 \div 7 = 3$	$56 \div 7 = 8$
$28 \div 7 = 4$	$63 \div 7 = 9$
$35 \div 7 = 5$	$70 \div 7 = 10$

ORAL EXERCISES

Read, and supply the missing numbers:

1. $7 \div () = 7.$

6. $42 \div () = 7.$

2. $14 \div () = 7.$

7. $49 \div () = 7.$

3. $21 \div () = 7.$

8. $56 \div () = 7.$

4. $28 \div () = 7.$

9. $63 \div () = 7.$

5. $35 \div () = 7.$

10. $70 \div () = 7.$

11. State the number of 7's in 49. In 14. In 28. In 42. 35. 70. 56. 63. 7. 21.

12. How many 7-cent marbles can be bought for 14 cts.? For 21 cts.? For 35 cts.? For 63 cts.? For 28 cts.?

13. How many weeks in 21 days? 42 days? 49 days? 14 days? 70 days? 56 days?

14. How many 7-cent bunches of fire-crackers could be bought for 25 cts.? What would be the change? Answer the same for 50 cts. 75 cts. 60 cts. 40 cts. 30 cts.

15. How many days in $\frac{1}{7}$ of two weeks?

16. What is $\frac{2}{7}$ of 21 days? Of 35 days?

17. A man earned 56 dollars a month and spent $\frac{5}{7}$ of it. How many dollars did he spend?

WRITTEN EXERCISES

Copy and fill the blanks:

1. $35 \div 7 = (\quad)$. 3. $63 \div 7 = (\quad)$. 5. $42 \div 7 = (\quad)$.

2. $70 \div 7 = (\quad)$. 4. $49 \div 7 = (\quad)$. 6. $28 \div 7 = (\quad)$.

Copy and divide:

7. $7 \overline{)56}$	12. $7 \overline{)49}$	17. $7 \overline{)539}$	22. $7 \overline{)245}$
8. $7 \overline{)63}$	13. $7 \overline{)42}$	18. $7 \overline{)175}$	23. $7 \overline{)329}$
9. $7 \overline{)70}$	14. $7 \overline{)112}$	19. $7 \overline{)203}$	24. $7 \overline{)770}$
10. $7 \overline{)35}$	15. $7 \overline{)441}$	20. $7 \overline{)623}$	25. $7 \overline{)812}$
11. $7 \overline{)280}$	16. $7 \overline{)357}$	21. $7 \overline{)504}$	26. $7 \overline{)315}$

Solve:

27. How many barrels of flour at \$7 a bbl. can be bought for \$364?

28. What is $\frac{1}{4}$ of 203? What is $\frac{2}{7}$ of 203?

29. Find $\frac{3}{7}$ of 203. $\frac{4}{7}$ of 203. $\frac{5}{7}$ of 203. $\frac{6}{7}$ of 203.

30. There are 672 pupils in a school, of which $\frac{3}{4}$ are in the primary grades. How many are in the primary grades?

31. A pupil attends school $\frac{5}{7}$ of the time from September to June. Taking the school time to be 182 days, how many days does he attend?

32. A stage coach went 210 mi. in a week. How far did it go per day?

Multiplying by Eight

89. PREPARATORY.

1. How many plants in the first row?

2. How many plants in the second row? In each row?



3. How many plants in:

2 rows?

3 rows?

5 rows?

8 rows?

7 rows?

4 rows?

6 rows?

9 rows?

10 rows?

4. Count by 8's from 8 to 80. Write the multiples of 8 as you count.

5. How many sides has an octagon?
 If each side of an octagon is 2 ft., what
 is the distance around the octagon?
 What is the distance around an octagon
 3 ft. on a side? 5 ft.? 6 ft.? 8 ft.?
 10 ft.?



OCTAGON.

TABLE

$1 \times 8 = 8$	$6 \times 8 = 48$
$2 \times 8 = 16$	$7 \times 8 = 56$
$3 \times 8 = 24$	$8 \times 8 = 64$
$4 \times 8 = 32$	$9 \times 8 = 72$
$5 \times 8 = 40$	$10 \times 8 = 80$

ORAL EXERCISES

Read, and supply the missing numbers :

1. $8 \times () = 8.$

6. $8 \times () = 48.$

2. $8 \times () = 16.$

7. $8 \times () = 56.$

3. $8 \times () = 24.$

8. $8 \times () = 64.$

4. $8 \times () = 32.$

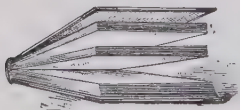
9. $8 \times () = 72.$

5. $8 \times () = 40.$

10. $8 \times () = 80.$

11. If there are 8 leaves in one section of a book,
 how many leaves are there in 3 such sections? In 5?

8? 6? 7? 10? 4? 2?



12. A man worked 8 hr. a day.
 How many hours did he work
 in 6 days?

13. A man worked 8 hr. a day. How many hours
 did he work in 5 days? 3 days? 7 days? 9 days?

WRITTEN EXERCISES

Copy and multiply:

1. 36 8 —	5. 19 8 —	9. 27 8 —	13. 88 8 —	17. 49 8 —	21. 110 8 —
2. 45 8 —	6. 57 8 —	10. 39 8 —	14. 100 8 —	18. 86 8 —	22. 124 8 —
3. 60 8 —	7. 93 8 —	11. 48 8 —	15. 33 8 —	19. 59 8 —	23. 105 8 —
4. 75 8 —	8. 69 8 —	12. 66 8 —	16. 90 8 —	20. 37 8 —	24. 98 8 —

Solve:

25. A motor car runs 18 mi. an hr. How far will it travel in 8 hr.?

26. A bicyclist rode 8 mi. an hr. How far did he ride in 28 hr.?

27. I have 8 rows of berry bushes with 36 bushes in each row. How many bushes are there in all?

28. On marching day the pupils of a grade marched in 8 rows of 28 pupils each. How many pupils are there in the grade?

29. There are 84 yd. of cloth in each of 8 rolls. How many yards are there altogether?

30. In some cities there are 8 blocks to the mile. How many blocks are there in 16 mi.?

31. A man earned \$8 a day. How much did he earn in 120 days?

Dividing by Eight

TABLE

$8 \div 8 = 1$	$48 \div 8 = 6$
$16 \div 8 = 2$	$56 \div 8 = 7$
$24 \div 8 = 3$	$64 \div 8 = 8$
$32 \div 8 = 4$	$72 \div 8 = 9$
$40 \div 8 = 5$	$80 \div 8 = 10$

ORAL EXERCISES

Read, and supply the missing numbers :

1. $8 \div () = 8.$ 6. $48 \div () = 8.$

2. $16 \div () = 8.$ 7. $56 \div () = 8.$

3. $24 \div () = 8.$ 8. $64 \div () = 8.$

4. $32 \div () = 8.$ 9. $72 \div () = 8.$

5. $40 \div () = 8.$ 10. $80 \div () = 8.$

11. Give the number of 8's in 24. In 32. 16. 40.
72. 80. 56. 48. 8. 16.

12. How many 8's and how many 1's besides in 45?
In 27? 44? 69? 63? 25? 36? 20? 43? 75?

13. If 8 leaves of a book are folded from 1 sheet of paper, how many sheets are needed for 24 leaves?
For 48? For 80? For 40? For 32? For 56?

14. How many 8-hour days did a man work who was employed 24 hr.? 40 hr.? 64 hr.? 80 hr.? 32 hr.? 56 hr.? 72 hr.?

15. How many quarts in $\frac{1}{8}$ bu.? In $\frac{5}{8}$ bu.?

16. How many hours in $\frac{3}{8}$ of a day?

WRITTEN EXERCISES

Copy and fill the blanks:

1. $32 \div 8 = (\quad)$. 4. $48 \div 8 = (\quad)$. 7. $40 \div 8 = (\quad)$.
 2. $80 \div 8 = (\quad)$. 5. $56 \div 8 = (\quad)$. 8. $72 \div 8 = (\quad)$.
 3. $64 \div 8 = (\quad)$. 6. $24 \div 8 = (\quad)$. 9. $16 \div 8 = (\quad)$.

Copy and divide:

- | | | | |
|-------------------------|-------------------------|-------------------------|-------------------------|
| 10. $8 \overline{)80}$ | 15. $8 \overline{)56}$ | 20. $8 \overline{)72}$ | 25. $8 \overline{)48}$ |
| 11. $8 \overline{)64}$ | 16. $8 \overline{)40}$ | 21. $8 \overline{)32}$ | 26. $8 \overline{)24}$ |
| 12. $8 \overline{)288}$ | 17. $8 \overline{)344}$ | 22. $8 \overline{)480}$ | 27. $8 \overline{)896}$ |
| 13. $8 \overline{)600}$ | 18. $8 \overline{)152}$ | 23. $8 \overline{)456}$ | 28. $8 \overline{)976}$ |
| 14. $8 \overline{)296}$ | 19. $8 \overline{)720}$ | 24. $8 \overline{)640}$ | 29. $8 \overline{)568}$ |

Solve:

30. A man worked 276 hr., 8 hr. per day. How many days did he work?

31. In spelling 104 words, Harold missed $\frac{1}{8}$ of them. How many did he spell correctly?

32. Find $\frac{1}{8}$ of 176. $\frac{3}{8}$ of 176. $\frac{5}{8}$ of 176.

33. A clerk received \$96 a month and spent $\frac{5}{8}$ of it. How many dollars did he spend?

Multiplying by Nine

90. PREPARATORY.

1. How many players are there in a baseball team? In 2 teams?

2. If each player of a team hits the ball 3 times in a game, how many hits are made by that team?

3. If each player of a team comes to bat 4 times in a game, how many times will that team be at bat?

4. How many players would there be in a league of 8 teams? In a league of 6 teams? 9 teams? 7 teams? 5 teams?

TABLE

$1 \times 9 = 9$	$6 \times 9 = 54$
$2 \times 9 = 18$	$7 \times 9 = 63$
$3 \times 9 = 27$	$8 \times 9 = 72$
$4 \times 9 = 36$	$9 \times 9 = 81$
$5 \times 9 = 45$	$10 \times 9 = 90$

ORAL EXERCISES

Read, and supply the missing numbers :

1. $9 \times () = 9.$

6. $9 \times () = 54.$

2. $9 \times () = 18.$

7. $9 \times () = 63.$

3. $9 \times () = 27.$

8. $9 \times () = 72.$

4. $9 \times () = 36.$

9. $9 \times () = 81.$

5. $9 \times () = 45.$

10. $9 \times () = 90.$

11. What is the cost of 3 yd. of ribbon at 9 cts. a yd.? What is the cost of 4 yd.? 8 yd.? 6 yd.? 5 yd.? 9 yd.? 10 yd.?

12. When thread is 9 cts. a spool, what is the cost of 2 spools? 6 spools? 5 spools? 9 spools? 8 spools? 10 spools? 7 spools? 4 spools?

13. When braid is 9 cts. a yd., what is the cost of 5 yd.? 7 yd.? 8 yd.? 6 yd.? 4 yd.?

WRITTEN EXERCISES

Copy and multiply :

1. 37 9 —	5. 43 9 —	9. 73 9 —	13. 67 9 —	17. 76 9 —
2. 54 9 —	6. 45 9 —	10. 35 9 —	14. 56 9 —	18. 44 9 —
3. 107 9 —	7. 98 9 —	11. 102 9 —	15. 111 9 —	19. 108 9 —
4. 99 9 —	8. 88 9 —	12. 75 9 —	16. 49 9 —	20. 25 9 —

Solve :

21. What is the cost of 9 yd. of cloth at 28 cts. a yd.?

22. How many plants in 9 rows of 19 plants each?

23. What is the cost of 9 lb. of coffee at 35 cts. a lb.?

24. A pleasure boat goes up the river 9 mi. and back daily. How many miles does it travel in 10 days?

25. There are 72 seats in a room, each of which cost \$9. What did the 72 seats cost?

26. In a class of 9 pupils, each wrote 42 words. How many words were written?

27. There were 75 pupils in a grade, and each made 9 number cards. How many cards did they make in all?

Dividing by Nine

TABLE

$9 \div 9 = 1$	$54 \div 9 = 6$
$18 \div 9 = 2$	$63 \div 9 = 7$
$27 \div 9 = 3$	$72 \div 9 = 8$
$36 \div 9 = 4$	$81 \div 9 = 9$
$45 \div 9 = 5$	$90 \div 9 = 10$

ORAL EXERCISES

Read, and supply the missing numbers:

1. $9 \div () = 9.$

6. $54 \div () = 9.$

2. $18 \div () = 9.$

7. $63 \div () = 9.$

3. $27 \div () = 9.$

8. $72 \div () = 9.$

4. $36 \div () = 9.$

9. $81 \div () = 9.$

5. $45 \div () = 9.$

10. $90 \div () = 9.$

11. How many 9's in 90? In 27? 81? 63? 45?
72? 54? 9? 18? 36?

12. How many 9's and how many 1's besides in 75?
In 92? 50? 84? 48? 82? 60? 12? 17? 37?

13. How many yards of lace at 9 cts. a yd. can be
bought for 45 cts.? For 63 cts.? 90 cts.? 36 cts.?
45 cts.? 72 cts.? 81 cts.?

WRITTEN EXERCISES

Copy and fill the blanks:

1. $81 \div 9 = ().$ 3. $63 \div 9 = ().$ 5. $72 \div 9 = ().$

2. $54 \div 9 = ().$ 4. $45 \div 9 = ().$ 6. $36 \div 9 = ().$

Copy and divide:

7. $9\overline{)81}$	12. $9\overline{)45}$	17. $9\overline{)36}$	22. $9\overline{)27}$
8. $9\overline{)72}$	13. $9\overline{)63}$	18. $9\overline{)54}$	23. $9\overline{)18}$
9. $9\overline{)261}$	14. $9\overline{)486}$	19. $9\overline{)963}$	24. $9\overline{)891}$
10. $9\overline{)387}$	15. $9\overline{)405}$	20. $9\overline{)882}$	25. $9\overline{)792}$
11. $9\overline{)657}$	16. $9\overline{)225}$	21. $9\overline{)504}$	26. $9\overline{)972}$

Solve:

27. What is $\frac{1}{9}$ of 207? $\frac{4}{9}$ of 207? $\frac{7}{9}$ of 207?
28. How many boat crews of 9 each could be selected from 144 men?
29. How many posts 9 yd. apart are there in a fence 252 yd. long, counting a post at each end?
30. How many strips of paper 9 yd. long can be cut from a roll of 306 yd.?
31. How many boards 9 ft. long and placed end to end are needed to reach 801 ft.?
32. A lawn contains 720 sq. yd.; $\frac{1}{9}$ is laid out in flower beds. How many square yards in the flower beds?
33. A walk 549 ft. long is made of sections each 9 ft. long. How many sections in the whole walk?
34. A man has a farm of 216 acres of which $\frac{3}{9}$ is wooded. How many acres of this farm are wooded?
35. How many different classes of 9 each can be made from 153 pupils?

REVIEW AND PRACTICE

ORAL EXERCISES

1. Multiply:

10	7	8	9	6	4	5	1	2	3
<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>

2. In Exercise 1, replace the row of 2's by a row of 3's and multiply. Then use 4's; then 5's; and so on to 10's.

In the exercise below give the result of dividing each number in each row by the first number in the row :

3.	3	12	18	36	24	15	21
4.	4	12	24	48	32	28	16
5.	5	25	60	45	35	20	80
6.	6	12	36	72	24	54	42
7.	7	49	14	28	35	42	63
8.	8	64	80	24	32	48	72
9.	9	45	81	72	36	63	90

10. How many hours in $\frac{1}{3}$ of a day of 24 hours? In $\frac{1}{6}$ of it? In $\frac{1}{4}$ of it? In $\frac{1}{8}$ of it?

11. When $\frac{4}{5}$ of April has passed, how many days remain?

12. What is the cost of 3 yd. of braid at 6 cts. a yd.? At 8 cts. a yd.? 5 cts.? 9 cts.? 7 cts.? 10 cts.?

WRITTEN EXERCISES

Multiply every number in each row by the first number in the row :

1.	6	25	19	102	74	45	69	83	60
2.	7	83	102	25	45	33	25	41	31
3.	8	67	84	74	69	55	19	68	17
4.	9	41	75	83	102	64	109	32	59

Divide every number in each row by the first number in the row :

5.	9	99	108	144	252	369	720	828
6.	8	88	96	144	256	512	336	928
7.	7	84	77	147	252	364	511	777
8.	6	72	96	108	252	360	720	966

9. Using 1 in. in the picture for 1 yd. in the object, draw the picture of a floor 8 yd. by 10 yd. Divide it so as to make floors for 4 equal rooms.

10. How many yards of carpet 1 yd. wide will it take to cover one of these rooms?

11. At 20 cents a sq. yd., what will it cost to paint one of these floors? Two of them? At 10 cts. a sq. yd., what will it cost to oil the other floor?

12. A man earning 28 dollars a week spends $\frac{1}{7}$ of his wages for board and saves $\frac{2}{7}$. How many dollars does he spend for other things?

REFERENCE TABLES

MULTIPLICATION

1. $1 \times 2 = 2$

$2 \times 2 = 4$

$3 \times 2 = 6$

$4 \times 2 = 8$

$5 \times 2 = 10$

$6 \times 2 = 12$

$7 \times 2 = 14$

$8 \times 2 = 16$

$9 \times 2 = 18$

$10 \times 2 = 20$

4. $1 \times 5 = 5$

$2 \times 5 = 10$

$3 \times 5 = 15$

$4 \times 5 = 20$

$5 \times 5 = 25$

$6 \times 5 = 30$

$7 \times 5 = 35$

$8 \times 5 = 40$

$9 \times 5 = 45$

$10 \times 5 = 50$

7. $1 \times 8 = 8$

$2 \times 8 = 16$

$3 \times 8 = 24$

$4 \times 8 = 32$

$5 \times 8 = 40$

$6 \times 8 = 48$

$7 \times 8 = 56$

$8 \times 8 = 64$

$9 \times 8 = 72$

$10 \times 8 = 80$

2. $1 \times 3 = 3$

$2 \times 3 = 6$

$3 \times 3 = 9$

$4 \times 3 = 12$

$5 \times 3 = 15$

$6 \times 3 = 18$

$7 \times 3 = 21$

$8 \times 3 = 24$

$9 \times 3 = 27$

$10 \times 3 = 30$

5. $1 \times 6 = 6$

$2 \times 6 = 12$

$3 \times 6 = 18$

$4 \times 6 = 24$

$5 \times 6 = 30$

$6 \times 6 = 36$

$7 \times 6 = 42$

$8 \times 6 = 48$

$9 \times 6 = 54$

$10 \times 6 = 60$

8. $1 \times 9 = 9$

$2 \times 9 = 18$

$3 \times 9 = 27$

$4 \times 9 = 36$

$5 \times 9 = 45$

$6 \times 9 = 54$

$7 \times 9 = 63$

$8 \times 9 = 72$

$9 \times 9 = 81$

$10 \times 9 = 90$

3. $1 \times 4 = 4$

$2 \times 4 = 8$

$3 \times 4 = 12$

$4 \times 4 = 16$

$5 \times 4 = 20$

$6 \times 4 = 24$

$7 \times 4 = 28$

$8 \times 4 = 32$

$9 \times 4 = 36$

$10 \times 4 = 40$

6. $1 \times 7 = 7$

$2 \times 7 = 14$

$3 \times 7 = 21$

$4 \times 7 = 28$

$5 \times 7 = 35$

$6 \times 7 = 42$

$7 \times 7 = 49$

$8 \times 7 = 56$

$9 \times 7 = 63$

$10 \times 7 = 70$

9. $1 \times 10 = 10$

$2 \times 10 = 20$

$3 \times 10 = 30$

$4 \times 10 = 40$

$5 \times 10 = 50$

$6 \times 10 = 60$

$7 \times 10 = 70$

$8 \times 10 = 80$

$9 \times 10 = 90$

$10 \times 10 = 100$

REFERENCE TABLES

DIVISION

1. $2 \div 2 = 1$	4. $5 \div 5 = 1$	7. $8 \div 8 = 1$
$4 \div 2 = 2$	$10 \div 5 = 2$	$16 \div 8 = 2$
$6 \div 2 = 3$	$15 \div 5 = 3$	$24 \div 8 = 3$
$8 \div 2 = 4$	$20 \div 5 = 4$	$32 \div 8 = 4$
$10 \div 2 = 5$	$25 \div 5 = 5$	$40 \div 8 = 5$
$12 \div 2 = 6$	$30 \div 5 = 6$	$48 \div 8 = 6$
$14 \div 2 = 7$	$35 \div 5 = 7$	$56 \div 8 = 7$
$16 \div 2 = 8$	$40 \div 5 = 8$	$64 \div 8 = 8$
$18 \div 2 = 9$	$45 \div 5 = 9$	$72 \div 8 = 9$
$20 \div 2 = 10$	$50 \div 5 = 10$	$80 \div 8 = 10$
2. $3 \div 3 = 1$	5. $6 \div 6 = 1$	8. $9 \div 9 = 1$
$6 \div 3 = 2$	$12 \div 6 = 2$	$18 \div 9 = 2$
$9 \div 3 = 3$	$18 \div 6 = 3$	$27 \div 9 = 3$
$12 \div 3 = 4$	$24 \div 6 = 4$	$36 \div 9 = 4$
$15 \div 3 = 5$	$30 \div 6 = 5$	$45 \div 9 = 5$
$18 \div 3 = 6$	$36 \div 6 = 6$	$54 \div 9 = 6$
$21 \div 3 = 7$	$42 \div 6 = 7$	$63 \div 9 = 7$
$24 \div 3 = 8$	$48 \div 6 = 8$	$72 \div 9 = 8$
$27 \div 3 = 9$	$54 \div 6 = 9$	$81 \div 9 = 9$
$30 \div 3 = 10$	$60 \div 6 = 10$	$90 \div 9 = 10$
3. $4 \div 4 = 1$	6. $7 \div 7 = 1$	9. $10 \div 10 = 1$
$8 \div 4 = 2$	$14 \div 7 = 2$	$20 \div 10 = 2$
$12 \div 4 = 3$	$21 \div 7 = 3$	$30 \div 10 = 3$
$16 \div 4 = 4$	$28 \div 7 = 4$	$40 \div 10 = 4$
$20 \div 4 = 5$	$35 \div 7 = 5$	$50 \div 10 = 5$
$24 \div 4 = 6$	$42 \div 7 = 6$	$60 \div 10 = 6$
$28 \div 4 = 7$	$49 \div 7 = 7$	$70 \div 10 = 7$
$32 \div 4 = 8$	$56 \div 7 = 8$	$80 \div 10 = 8$
$36 \div 4 = 9$	$63 \div 7 = 9$	$90 \div 10 = 9$
$40 \div 4 = 10$	$70 \div 7 = 10$	$100 \div 10 = 10$

FACTORS

91. We often need to know the **factors** of a number; that is, numbers that multiplied together make that number.

Thus, 3 and 2 are factors of 6 because 2×3 are 6. 3 and 3 are factors of 9, because 3×3 are 9. 3 and 4 are factors of 12; also 3, 2, and 2. Why?

The multiples help us to find factors.

Thus, 32 is a multiple of 4; hence 4 is a factor of 32.

ORAL EXERCISES

4 is a factor of each number. State the other factor:

- | | | | | |
|--------|--------|--------|--------|--------|
| 1. 8. | 3. 16. | 5. 36. | 7. 32. | 9. 20. |
| 2. 12. | 4. 40. | 6. 28. | 8. 24. | 10. 4. |

State factors of:

- | | | | | |
|---------|---------|---------|---------|---------|
| 11. 15. | 13. 9. | 15. 22. | 17. 30. | 19. 18. |
| 12. 12. | 14. 14. | 16. 27. | 18. 21. | 20. 40. |

WRITTEN EXERCISES

- What factors with 2 make 96?
- What factors with 5 make 100?
- What factors with 8 make 96?
- What factors with 2 and 3 make 42?
- What factors with 3 and 3 make 72?
- 5 is a factor of each of these numbers: 45; 65; 70; 100; 90; 55. Write the other factor of each.

FRACTIONS

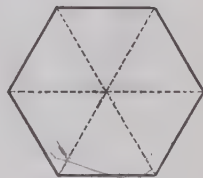
Thirds, Sixths, and Ninths

92. Draw a hexagon and divide it equally, like the figure.

1. Into how many parts is the hexagon divided?

2. Shade $\frac{1}{6}$ of it. Shade $\frac{1}{3}$ of it. Show that $\frac{1}{2}$ of $\frac{1}{3}$ of the hexagon is the same as $\frac{1}{6}$ of it.

3. Show that $\frac{4}{6}$ of the hexagon is the same as $\frac{2}{3}$ of it.



4. Show that $\frac{1}{3} + \frac{1}{6}$ of the hexagon is the same as $\frac{1}{2}$ of it.

5. Show that $\frac{2}{3} + \frac{1}{6}$ of the hexagon is the same as $\frac{5}{6}$ of it.

6. Show that $\frac{2}{3} - \frac{1}{6}$ of it is the same as $\frac{1}{2}$ of it.

7. Show that $\frac{1}{3} - \frac{1}{6}$ of it is the same as $\frac{1}{6}$ of it.

8. Draw a square 3 in. on a side, like the picture. Divide it into nine equal squares.



Each square is **one-ninth** of the whole figure.

9. Shade $\frac{1}{3}$ of the figure. $\frac{2}{3}$ of it. $\frac{6}{9}$ of it.

10. Show from the figure that $\frac{1}{3}$ is $\frac{3}{9}$. That $\frac{2}{3}$ is $\frac{6}{9}$.

11. Show that $\frac{6}{9} - \frac{1}{3}$ of the whole square is the same as $\frac{1}{3}$ of it.

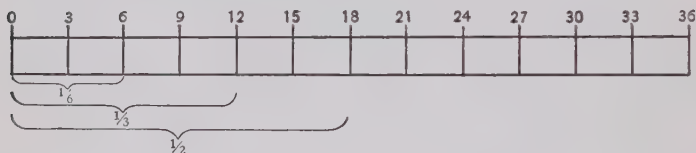
ORAL EXERCISES

1. Compare the number of inches in $\frac{1}{3}$ of a 12-inch line with that in $\frac{2}{3}$ of a 6-inch line.

2. Compare the number of inches in $\frac{1}{6}$ of a 12-inch line with that in $\frac{2}{3}$ of a 6-inch line.

3. How many inches in 1 ft.? How many in $\frac{1}{3}$ yd.?

4. How many inches in 3 ft.? In 1 yd.?



5. According to the figure, how many inches in $\frac{1}{6}$ yd.? How many inches in $\frac{2}{6}$ yd.? In $\frac{5}{6}$ yd.?

6. How many 9's in 36? How many 9-inch lengths in 1 yd.? How many inches in $\frac{1}{3}$ yd.? In $\frac{2}{3}$ yd.?

7. How many inches in $\frac{5}{9}$ yd.? In $\frac{7}{9}$ yd.? $\frac{8}{9}$ yd.?

8. Find the number of inches in $\frac{1}{3}$ yd. In $\frac{1}{9}$ yd. Show that $\frac{1}{3}$ yd. = $\frac{3}{9}$ yd. That $\frac{2}{3}$ yd. = $\frac{6}{9}$ yd.

Twelfths

93. There are twelve inches in a foot.

One inch is **one-twelfth** of a foot.

1. 5 inches are what part of a foot? 7 inches are what part of a foot?

2. Show from the foot-rule that $\frac{3}{12}$ of a ft. = $\frac{1}{4}$ ft. That $\frac{4}{12}$ ft. = $\frac{1}{3}$ ft. $\frac{8}{12}$ ft. = $\frac{2}{3}$ ft. $\frac{9}{12}$ ft. = $\frac{3}{4}$ ft.

ORAL EXERCISES

Show from the foot-rule that:

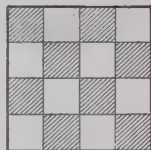
1. 1 third = 2 sixths.
2. 1 third = 3 ninths.
3. 2 thirds = 6 ninths.
4. 1 sixth = 2 twelfths.
5. 1 third = 4 twelfths.
6. 1 fourth = 3 twelfths.

Halves, Fourths, Eighths, Sixteenths

94. The picture shows a pattern of black and white tiling.

1. How many small squares are there?

Each square is **one-sixteenth** of the whole square.



2. How many are white? How many black? How many pairs, 1 black and 1 white, are there?

A black and white square together make one-eighth of the whole surface.

3. How many sixteenths in $\frac{1}{8}$? In $\frac{1}{4}$? In $\frac{1}{2}$?

4. How many eighths in $\frac{1}{4}$?

5. How many fourths in $\frac{1}{2}$?

6. Show from the picture that $\frac{1}{2} = \frac{2}{4} = \frac{4}{8} = \frac{8}{16}$.
That $\frac{3}{4} = \frac{6}{8} = \frac{12}{16}$.

WRITTEN EXERCISES

1. Draw a window with two sashes having 8 panes of glass each. Show that:

Each sash is $\frac{8}{16}$ of the whole window.

$\frac{1}{2}$ of each sash is $\frac{4}{16}$ of the whole window.

$\frac{1}{4}$ of each sash is $\frac{2}{16}$, or $\frac{1}{8}$, of the whole.

2. Write this table:

8 eighths = 1 whole.

16 sixteenths = 1 whole.

4 eighths = 1 half.

8 sixteenths = 1 half.

2 eighths = 1 fourth.

4 sixteenths = 1 fourth.

6 eighths = 3 fourths.

12 sixteenths = 3 fourths.

ORAL EXERCISES

Supply the numbers that are missing :

- | | |
|--------------------------------|--------------------------------|
| 1. In 14 there are () 7's. | $\frac{1}{2}$ of 14 is (). |
| 2. In 14 there are () 2's. | $\frac{1}{4}$ of 14 is (). |
| 3. In 15 there are () 3's. | $\frac{1}{5}$ of 15 is (). |
| 4. In 16 there are () 8's. | $\frac{1}{2}$ of 16 is (). |
| 5. In 16 there are () 4's. | $\frac{1}{4}$ of 16 is (). |
| 6. In 16 there are () 2's. | $\frac{1}{8}$ of 16 is (). |
| 7. In 18 there are () 9's. | $\frac{1}{2}$ of 18 is (). |
| 8. In 18 there are () 2's. | $\frac{1}{9}$ of 18 is (). |
| 9. In 32 there are () 2's. | $\frac{1}{16}$ of 32 is (). |
| 10. In 36 there are () 3's. | $\frac{1}{12}$ of 36 is (). |
| 11. In 48 there are () 4's. | $\frac{1}{12}$ of 48 is (). |
| 12. In 20 there are () 2's. | $\frac{1}{10}$ of 20 is (). |
| 13. In 24 there are () 2's. | $\frac{1}{12}$ of 24 is (). |

Solve :

14. How many oranges in $\frac{1}{3}$ of a doz.? In $\frac{1}{4}$ of a doz.? In one dozen and a half-dozen? In 1 doz. and $\frac{1}{4}$ doz.?

15. How many oranges in $\frac{1}{12}$ doz.? In $\frac{5}{12}$ doz.? In $\frac{11}{12}$ doz.?

16. How many hours in a day? In $\frac{1}{2}$ da.? In $\frac{1}{4}$ da.? In $\frac{1}{8}$ da.? In $\frac{1}{16}$ da.? In $\frac{1}{32}$ da.? In $\frac{1}{64}$ da.?

17. How many cents in $\frac{1}{5}$ of a quarter of a dollar? In $\frac{2}{5}$ of a quarter? $\frac{4}{5}$ of a quarter?

18. How many cents in $\frac{1}{4}$ of a dollar? In $\frac{1}{10}$ of a dollar?

19. How many ounces in $\frac{1}{16}$ of a lb.? In $\frac{3}{16}$ of 2 lb.?

20. If $\frac{1}{6}$ of a bin of coal is worth \$10, what is the whole quantity worth?

21. In November $\frac{3}{10}$ of the days were rainy, $\frac{1}{2}$ of the days were cloudy, and the remainder clear. How many days were clear?

Comparison

1							
$\frac{1}{2}$				$\frac{1}{2}$			
$\frac{1}{3}$		$\frac{1}{3}$			$\frac{1}{3}$		
$\frac{1}{4}$		$\frac{1}{4}$		$\frac{1}{4}$		$\frac{1}{4}$	
$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$
$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$

ORAL EXERCISES

Answer by examining the figure :

1. How many halves make 1?

2. How many fourths make $\frac{1}{2}$?

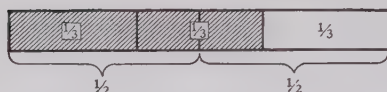
3. How many sixths make $\frac{1}{2}$? $\frac{1}{3}$? $\frac{2}{3}$?

4. How many eighths make $\frac{1}{4}$? $\frac{1}{2}$? $\frac{3}{4}$?

5. Which is the greater, $\frac{1}{2}$ or $\frac{1}{3}$? $\frac{1}{2}$ or $\frac{2}{3}$? $\frac{1}{6}$ or $\frac{1}{8}$?

$\frac{1}{6}$ or $\frac{3}{8}$? $\frac{2}{3}$ or $\frac{3}{4}$?

WRITTEN EXERCISES

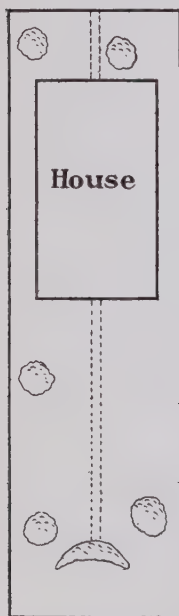


The diagram shows that $\frac{1}{2}$ is greater than $\frac{1}{3}$. Answer, by use of a diagram, which is the greater :

1. $\frac{3}{4}$ or $\frac{2}{4}$? 3. $\frac{2}{4}$ or $\frac{1}{2}$? 5. $\frac{3}{9}$ or $\frac{1}{3}$? 7. $\frac{3}{4}$ or $\frac{3}{5}$?
 2. $\frac{4}{5}$ or $\frac{4}{7}$? 4. $\frac{4}{5}$ or $\frac{3}{5}$? 6. $\frac{5}{10}$ or $\frac{1}{2}$? 8. $\frac{6}{12}$ or $\frac{2}{4}$?

Solve :

9. In the plan of the house and lot, 1 in. represents 32 ft. How many feet does $\frac{1}{2}$ of an in. represent?
 $\frac{3}{8}$ of an in.? $\frac{5}{8}$ of an in.?



10. Measure the length of the drawing. How many inches long is it? How many eighths of an inch?

11. How long is the lot represented in the drawing?

12. How wide is the drawing? How wide is the lot?

13. How many feet long is the house? How wide?

14. How many feet is the front of the house from the street.

15. How much does the distance found in Exercise 14 plus the length of the house differ from the length of the lot?

16. How long is the fence around the lot?

MEASUREMENT

Liquid Measure

ORAL EXERCISES

1. How many pints in a quart?
2. How many quarts in a gallon?
3. How many pints in a gallon?
4. A quart is what part of a gallon?
5. A pint is what part of a gallon?
6. 3 pt. are what part of a gal.? 5 pt. are what part of a gal.? 7 pt.?
7. How many pt. in $\frac{1}{4}$ of a gal.? In $\frac{3}{4}$ of a gal.? In $\frac{1}{8}$ gal.? In $\frac{3}{8}$ gal.? In $\frac{5}{8}$ gal.? In $\frac{7}{8}$ gal.?
8. How many pints in $1\frac{1}{2}$ gal.? In $1\frac{5}{8}$ gal.?
9. How many gallons in 80 pt.? In 56 pt.?

Dry Measure

ORAL EXERCISES

1. How many quarts in a peck?
2. How many pecks in a bushel?
3. How many quarts in a bushel?
4. A peck is what part of a bushel?
5. A quart is what part of a peck?
6. 2 qt. are what part of a peck? 2 qt. are what part of a bushel?

7. How many quarts in $\frac{3}{16}$ of a bu.? In $\frac{5}{16}$ bu.? In $\frac{7}{16}$ bu.? In $\frac{9}{16}$ bu.? In $\frac{15}{16}$ bu.?

8. How many quarts in $\frac{5}{8}$ bu.? In $\frac{3}{8}$ bu.? In $\frac{7}{8}$ bu.?

9. How many bushels in 72 pk.? In 32 pk.? In 56 pk.? In 80 pk.?

Measures of Time

ORAL EXERCISES

1. How many hours in a day?

2. How many minutes in an hour?

3. How many days in a week?

4. 2 wk. = () da.? 21 da. = () wk.?

5. $\frac{1}{2}$ hr. = () min.? $1\frac{1}{2}$ hr. = () min.?

6. $\frac{1}{2}$ da. = () hr.? $\frac{1}{3}$ da. = () min.?

7. How many hours in $\frac{1}{2}$ of an 8-hour working day? In $\frac{1}{4}$ of such a day? In $\frac{3}{4}$ of it?

8. A school day is 6 hr. long. How many hours in $\frac{1}{2}$ of a school day? In $\frac{1}{3}$ of it? In $\frac{2}{3}$ of it?

9. When the daylight lasts 12 hr. at a time, how many hours in $\frac{1}{2}$ of the time of daylight? In $\frac{1}{4}$ of it? In $\frac{1}{3}$ of it? In $\frac{3}{4}$ of it? In $\frac{1}{6}$ of it? In $\frac{5}{6}$ of it?

10. How many hours in $\frac{1}{8}$ of a whole day? In $\frac{3}{8}$ of it? In $\frac{5}{8}$ of it?

WRITTEN EXERCISES

1. How many minutes in $\frac{5}{6}$ of an hr.?

2. How many minutes in $\frac{2}{3}$ of an hr.?

3. How many minutes in $\frac{3}{4}$ of an hr.?

4. How many minutes in $1\frac{2}{3}$ hr.? In $2\frac{1}{2}$ hr.?
5. How many hours in a whole week?
6. How many days in 45 wk.? In 72 wk.?
7. How many weeks in 728 da.? In 847 da.?
8. How many minutes from 9:45 o'clock to 11:15 o'clock in the same forenoon?

Measures of Weight



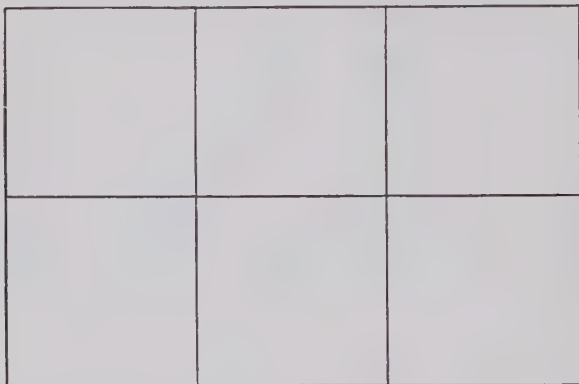
ORAL EXERCISES

1. How many ounces in a pound?
2. How many 4-ounce bags weigh as much as a 1-pound bag?
3. An 8-ounce weight is what part of a pound?
4. An ounce weight is what part of a pound?
5. 3 oz. are how many 16ths of a pound? 5 oz.? 9 oz.? 15 oz.?
6. How many ounces in $\frac{3}{4}$ of a lb.? In $\frac{1}{8}$ of a lb.? In $\frac{5}{8}$ lb.? $\frac{3}{8}$ lb.? $\frac{3}{16}$ lb.? $\frac{9}{16}$ lb.?
7. How many ounces in $1\frac{1}{2}$ lb.? In $2\frac{1}{4}$ lb.?
8. When grapes are 20 cts. a lb., what is the cost of 4 oz.? Of 8 oz.? Of 12 oz.?
9. I bought $\frac{1}{2}$ lb. of spice worth 4 cts. an oz. How much did it cost?

Square Measure

95. PREPARATORY.

1. How many square inches (sq. in.) in the first row of this rectangle?



2. How many square inches in each row? How many in both rows?

$$2 \times 3 \text{ sq. in.} = (\quad) \text{ sq. in.}$$

3. How many square inches in the surface of the rectangle in the figure?

The size of any surface is called its **area**.

96. *The area of a rectangle is found by multiplying together the numbers that measure its length and width.*

The length and width must be of the same kind; that is, inches and inches, or feet and feet.

Thus, the area of a rectangle 2 in. wide and 1 ft. (12 in.) long, is 2×12 sq. in., or 24 sq. in.

ORAL EXERCISES

1. What is the area of a rectangle 4 in. by 8 in.?

2. What is the area of a rectangle 8 in. long and 6 in. wide?

State the areas of the following rectangles:

3. 4 in. by 5 in. 5. 8 in. by 9 in. 7. 3 ft. by 5 ft.

4. 9 yd. by 10 yd. 6. 8 ft. by 7 ft. 8. 6 in. by 9 in.

Solve:

9. My room is 10 ft. wide and contains 150 sq. ft. How long is it?

10. How many feet of fence will it take to fence in a garden bed 10 ft. long, containing 100 sq. ft.?

11. How many crackers 3 in. square can be placed on the bottom of a box 9 in. wide and 12 in. long?

12. How many squares of cement 3 ft. in a side are needed to cover a court 12 ft. by 15 ft.?

13. How many square yards in a lawn 18 yds. long and 5 yds. wide?

14. A playground is 8 yds. wide and contains 216 sq. yds. How long is the playground?

15. How many square feet in a floor 10 ft. by 15 ft.? How many square feet in a rug 2 yds. by 3 yds.? If the rug lies on the floor, how many sq. ft. are not covered by the rug?

16. Mary's tablet is 8 in. by 9 in. How many sq. in. are there in the two sides of one sheet of her tablet?

17. How many square inches in the surface of 4 window panes each 9 in. by 12 in.?

REVIEW AND PRACTICE

ORAL EXERCISES

1. $\frac{1}{2}$ gal. = () pt.? $\frac{3}{4}$ gal. = () pt.? $\frac{4}{8}$ qt. = () pt.?
2. $3\frac{3}{4}$ bu. = () pk.? $\frac{3}{8}$ pk. = () qt.? $\frac{5}{16}$ bu. = () qt.?
3. $\frac{1}{2}$ bu. = () pt.? $\frac{3}{4}$ bu. = () qt.? $\frac{5}{8}$ bu. = () qt.?
4. 1 lb. = () oz.? $1\frac{1}{2}$ lb. = () oz.? 32 oz. = () lb.?
5. What is the cost of 5 oz. of flower-seeds at 32 cts. a lb.?
6. Four bean bags have the following weights: 8 oz., 4 oz., 4 oz., and 2 lb. How many pounds do the four weigh?
7. 32 sq. yd. of land are divided into 8 equal parts. How many acres are there in each part?
8. How many square feet are there in the surface of a table 8 ft. long and 3 ft. wide?
9. How many yards are there in the length of a tablecloth 11 ft. long?
10. How many hours in a week does a man work who works 8 hr. a day?
11. Make 10 strokes and cross out $\frac{4}{5}$ of them. How many fifths of the whole number remain? How many tenths are crossed out?
12. From 10 blocks $\frac{3}{10}$ are taken. How many blocks are left?
13. How many sixteenths are equal to $\frac{3}{8}$? To $\frac{5}{8}$?

14. $\frac{1}{16}$ is what part of $\frac{1}{8}$? $\frac{3}{16}$ are what part of $\frac{1}{4}$?
15. $\frac{1}{16}$ is what part of $\frac{3}{8}$? Of $\frac{4}{8}$? Of $\frac{1}{2}$? Of $\frac{5}{8}$?
16. Henry sleeps 8 hr. a day. What part of the day is he awake?
17. How many 5-pound sacks of salt weigh 50 lb.?
18. How many 8-pound jars of butter weigh as much as a 56-pound tub?
19. If a bar of soap weighs $\frac{1}{4}$ of a lb., what is the weight of 100 bars?
20. The rate of postage for letters within the United States is 2 cents per ounce or part of an ounce. What is the postage on a letter weighing 2 oz.?
21. What is the postage on a letter weighing $2\frac{1}{4}$ oz. sent to any part of the United States?
22. The rate of postage on books is 1 cent for each 2 ounces or part of 2 ounces. What does it cost to send a book weighing 8 oz.? To send 3 books, each weighing 14 oz.?
23. What is the postage on a book weighing 2 lb.?
24. If a package sent at the rate of 1 ct. an ounce costs 32 cts., how many pounds does the package weigh?
25. What is the postage on a 2-pound package of books and a 2-pound package of toys (at 1 ct. an oz.)?
26. Find by weighing some sheets of writing-paper and an envelope how many sheets of paper with the envelope can be sent for 2 cts.
27. What will be the postage on a letter containing 12 sheets of this paper?

GENERAL REVIEW

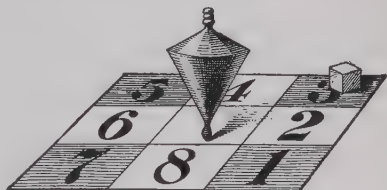
ORAL EXERCISES

1. Name the first three places in a whole number.
2. What number has 1 in the first place, 2 in the second, and 3 in the third?
3. Name coins the sum of whose values is 85 cts.
4. Count the change from \$1 for a 67-cent purchase.
5. Read the Roman numbers: LXXVIII; XCIV; LV; XCI; LXVII; XLIX.
6. Name the multiples of 6 from 6 to 60.
7. Name the multiples of 9 from 9 to 90.
8. Name the multiples of 8 from 8 to 80.
9. Name the multiples of 7 from 7 to 70.
10. How many days in $\frac{1}{6}$ of June? How many days in $\frac{5}{6}$ of September?
11. How many days in $\frac{5}{7}$ of a week?
12. How many sixths in $\frac{1}{3}$? In $\frac{2}{3}$? How many ninths in $\frac{1}{3}$? In $\frac{2}{3}$? In $\frac{4}{6}$?
13. $\frac{1}{8}$ of a bin of coal is worth \$9. What is the whole quantity worth?
14. How many sixteenths in $\frac{1}{4}$? In $\frac{3}{4}$?
15. What is the area of a book cover 5 in. by 6 in.?
16. How many quarts in $\frac{5}{8}$ of a bu.?
17. 4 casks of oil contain 52 gal. each. How many gallons are there in the 4 casks?

18. George had \$1.40 in silver in the least number of coins possible. What coins did he have?

19. The top is made to spin in the middle space of the square.

A cube is dropped on the top, which throws it upon some square. The number on the square tells how much



it counts. Thus, if the cube falls on the square 4 the first time and on 3 the next time, the total count is 7.

Find the total count in this series of 6 throws: 2 times on 5, 3 times on 4, once on 8.

4 times on 5, 2 times on 1, 3 times on 3, once on 7.

20. If the cube falls on 2 six times, on 6 five times, and on 7 five times, what is the total count?

21. If the cube falls on 2 nine times, on 7 three times, and on 8 nine times, what is the total count?

22. Make and solve 5 more problems for this game.

WRITTEN EXERCISES

Add :

$$\begin{array}{r} 1. \quad 663 \\ \quad 176 \\ \hline \end{array}$$

$$\begin{array}{r} 3. \quad 299 \\ \quad 488 \\ \hline \end{array}$$

$$\begin{array}{r} 5. \quad 173 \\ \quad 808 \\ \hline \end{array}$$

$$\begin{array}{r} 7. \quad 222 \\ \quad 677 \\ \hline \end{array}$$

$$\begin{array}{r} 2. \quad \$17.25 \\ \quad 9.80 \\ \hline \end{array}$$

$$\begin{array}{r} 4. \quad \$40.05 \\ \quad 17.60 \\ \hline \end{array}$$

$$\begin{array}{r} 6. \quad \$84.56 \\ \quad 29.37 \\ \hline \end{array}$$

$$\begin{array}{r} 8. \quad \$55.18 \\ \quad 24.65 \\ \hline \end{array}$$

Subtract :

$$\begin{array}{r} 9. \quad \$25.60 \\ \quad 9.89 \\ \hline \end{array}$$

$$\begin{array}{r} 10. \quad \$57.65 \\ \quad 29.37 \\ \hline \end{array}$$

$$\begin{array}{r} 11. \quad \$95.75 \\ \quad 36.45 \\ \hline \end{array}$$

$$\begin{array}{r} 12. \quad \$88.77 \\ \quad 16.99 \\ \hline \end{array}$$

Multiply :

13. 63	14. 109	15. 144	16. 95	17. 240
<u>6</u>	<u>7</u>	<u>6</u>	<u>9</u>	<u>4</u>

Divide :

18. $8 \overline{)872}$	19. $7 \overline{)504}$	20. $9 \overline{)846}$	21. $6 \overline{)450}$
-------------------------	-------------------------	-------------------------	-------------------------

Write the table of :

- | | |
|---------------------|-----------------------|
| 22. Liquid measure. | 24. Linear measure. |
| 23. Dry measure. | 25. Measures of time. |

Solve :

26. How many square feet in a court 105 ft. long and 9 ft. wide ?

27. The six coaches of a train leave New York carrying, in order, 27, 69, 54, 47, 32, 18 passengers. How many passengers on the train ?

28. Before the train mentioned in Exercise 27 arrives in Boston, 197 passengers get on, and 213 get off, at different stations. How many passengers does the train carry into Boston ?

29. A bridge has a carriage way 38 ft. wide ; 4 trolley beds each 15 ft. wide ; and 2 footways each 11 ft. wide. How many feet wide is the bridge ?

30. Robert deposited in the savings bank \$1.25 in January, \$2.30 in February, \$1.70 in March, \$4.35 in April, and \$3.25 for each of the other months of the year. How much did he deposit during the year ?

31. A car contains 120 bbl. of apples. If each barrel contains 3 bu., how many bushels of apples are there in the car ?

32. A rectangular garden 48 yd. long and 24 yd. wide is divided by fences running lengthwise into 3 equal parts. What is the length and breadth of each part?

33. One part is set with 7 rows of celery plants, 143 in a row. How many plants in this part?

34. 19 rows of strawberry plants yield 64 qt. per row during the season. How many quarts is this?

35. 8 bu. of strawberries are sold at \$3.50 a bu.; 6 bu. are sold for \$2.75 a bu. Find the amount received for the 14 bu.

36. If each of the 7 rows of celery plants produces \$4.75 worth of celery, how much is the celery worth?

Write problems, using the facts given, and write the answers to each:

37. Lace, 50 cts. a yd. 38. 1 Dictionary, \$10.00.
Silk, \$1.50 a yd. 3 maps: one at \$3.85,
Buttons, 15 cts. a doz. one at \$4.50, one at \$5.

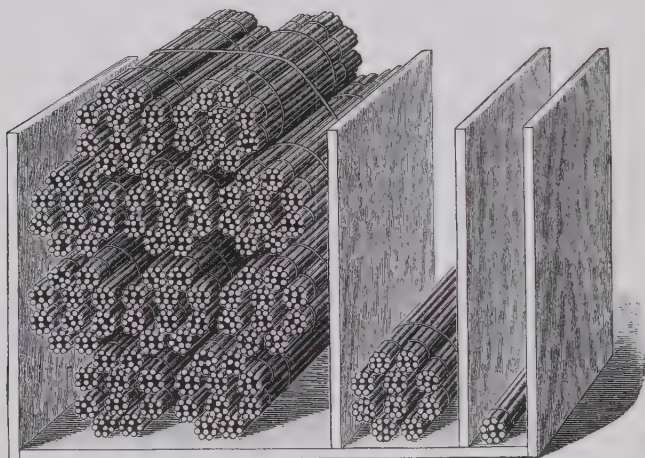
39. 143 mi. from New York to Albany.
148 mi. " Albany to Syracuse.
80 mi. " Syracuse to Rochester.
92 mi. " Rochester to Niagara Falls.

40. An assembly hall contains 22 rows of seats: the first 3 rows seat each 18 persons; the next 4 rows, each 22 persons; the next 6, each 26 persons; and the remaining rows each 30 persons.

CHAPTER IV

NOTATION AND NUMERATION

97. PREPARATORY.



1. How many tens make 1 hundred ?
2. How many hundreds make 1 thousand ?
3. How many thousands are one thousand and one thousand ?

Two thousand is written in figures, 2,000.

4. Read: 3,000; 7,000; 6,000; 6,300; 5,000; 4,300; 8,000; 9,500; 5,400; 7,400.

5. Write in figures: 2 thousand; 4 thousand; 5 thousand; 8 thousand; 9 thousand; 6 thousand.

In writing numbers greater than 1000 it is best to place a comma after the number of thousands.

Thus, in 3,125 (three thousand one hundred twenty-five), a comma is placed after the 3. This is not done in dates.

98. The method of naming or reading numbers is called **numeration**. The method of writing numbers is called **notation**.

ORAL EXERCISES

Read the number of miles by water from New York City to :

- | | |
|-------------------------------|---------------------------------|
| 1. Boston 310. | 8. Havana 1,420. |
| 2. Buenos Ayres . . . 7,110. | 9. Liverpool 3,210. |
| 3. Cape Horn 8,115. | 10. London 3,375. |
| 4. Charleston 750. | 11. New Orleans . . . 2,045. |
| 5. Dublin 3,225. | 12. Panama 2,358. |
| 6. Gibraltar 3,300. | 13. Philadelphia 240. |
| 7. Halifax 612. | 14. Porto Rico 1,400. |

WRITTEN EXERCISES

Write in figures :

- One thousand three hundred seventy-five.
- Five thousand four hundred.
- Seven thousand five hundred twenty-three.
- Sixty thousand nine hundred forty.
- Three thousand seven.
- Seven thousand twenty.
- One thousand forty-nine.
- Nine thousand eight hundred.

99. PREPARATORY.

1. What is the first place at the right in a whole number? The second place from the right? The third? The fourth?

100. 10 thousands are grouped into 1 *ten-thousand*. The number of ten-thousands is written to the left of thousands' place.

Read:

1. 20,000. 2. 25,000. 3. 97,000. 4. 35,000.

101. 10 ten-thousands are grouped into 1 *hundred-thousand*, and the number of hundred thousands is written to the left of ten-thousands' place.

1. In 762,804 name each place and the figure that occupies it.

2. Write 325,689 and above each figure write the name of its place.

102. 999 thousands and 1 thousand are 1000 thousands, or 1 *million*. One million is written in figures 1,000,000.

103. We put a comma between the hundreds and the thousands, and between the thousands and the millions. That is, beginning from the right, we mark off the figures into **periods** of three each. The first period contains units, tens, hundreds, and is called **units' period**. The second period contains thousands, ten-thousands, hundred-thousands, and is called **thousands' period**. The third period contains the millions.

In reading the thousands' period, the word "thousands" is omitted in the case of ten-thousands and of hundred-thousands. The whole period is read as if it were units' period and then the word "thousand" is added. Thus, in the number 762,804, the second period is read: "Seven hundred sixty-two thousand."

Millions	Hundred-thousands	Ten-thousands	Thousands	Hundreds	Tens	Units
1	2	1	4	7	2	8
	THOUSANDS' PERIOD			UNITS' PERIOD		

ORAL EXERCISES

Read:

1. 100,000.
2. 125,000.
3. 125,568.
4. 634,305.
5. 723,325.
6. 690,437.

7. In a recent year the mines of the world produced 80,643 tons of tin, 787,841 tons of lead, 446,373 tons of zinc, and 543,735 tons of copper.

WRITTEN EXERCISES

1. Write twenty-five thousand, five hundred fifteen.
2. Write five hundred five thousand, seventy-five.
3. Write five hundred thousand, five hundred twenty-five.
4. Write 8 hundred twenty-five thousand, one.
5. Write 7 hundred five thousand, one hundred four.

Roman Notation

104. PREPARATORY.

1. What is meant by Roman notation?
2. Name some of its uses.
3. For what numbers do the following letters stand: L? V? X? C?
4. Write the Roman numbers from 10 to 50.
5. Write in Roman numerals the multiples of 10 from 50 to 100.

105. The Roman numeral for 500 is D. That for 1000 is M. Then CD is 400, and CM is 900.

$$\text{DCCIX} = 709.$$

$$\text{CDIV} = 404.$$

$$\text{MDCCC} = 1,800.$$

$$\text{CMXLV} = 945.$$

ORAL EXERCISES

Read:

- | | | |
|-----------|--------------|-------------|
| 1. CDXIX. | 4. MCM. | 7. CXLVIII. |
| 2. CMIV. | 5. CCCLXXIX. | 8. MCCLXI. |
| 3. MCMIV. | 6. CDXCIX. | 9. MCCCXXX. |

WRITTEN EXERCISES

Write in Roman notation:

1. 1904.
2. 1900.
3. 1899.
4. 1892.
5. The year in which Columbus discovered America.
6. The number of the year in which the Thirteen Colonies gained their independence.
7. The first year of the twentieth century.
8. The number of the present year.

ADDITION

106. EXAMPLE: In an election a certain town cast 135 votes for President; another cast 276; another 189; and another 215. How many votes were cast in the four towns?

Add 135, 276, 189, and 215.

135	} Addends	When the columns are long, write the partial sums and add them afterward, as in this example:
276		
189		
215		
<hr/> 25		Add upward. The sum of the first column is 25 units. The sum of the second is 19 tens, and the sum of the third is 6 hundreds. Adding these, the result is 815, the number of votes cast.
19		
6		
<hr/> 815	Sum	
		<i>Test:</i> Add the addends downward and see if the result is 815.

107. Addition is the process of counting two or more numbers into a single number.

The numbers added are called **addends**.

The result of addition is called the **sum**.

WRITTEN EXERCISES

1. The lengths of the five Great Lakes are:

Lake Michigan.....	330 mi.	Lake Erie.....	270 mi.
Lake Superior.....	380 mi.	Lake Ontario.....	180 mi.
Lake Huron.....		250 mi.	

Find the combined lengths of Lakes Michigan, Superior, and Huron. Of all the lakes.

2. The following table shows the attendance of 5 grades of a primary school for 1 week. Find the total attendance of each grade for each day, and the total attendance of each grade for the week:

GRADE	<i>Mon.</i>	<i>Tues.</i>	<i>Wed.</i>	<i>Thurs.</i>	<i>Fri.</i>	<i>Total</i>
1	100	98	97	101	99	
2	120	119	118	120	116	
3	78	79	80	75	78	
4	105	104	101	104	103	
5	98	95	98	96	97	
<i>Total</i>						

3. The following table shows the amount of sales made by each of 10 clerks in a department store for one week. Find the total sales made by each clerk for the week. Find the total sales for each day:

SALESMAN	<i>Mon.</i>	<i>Tues.</i>	<i>Wed.</i>	<i>Thurs.</i>	<i>Fri.</i>	<i>Sat.</i>	<i>Total</i>
No. 1	\$125	\$150	\$230	\$175	\$300	\$625	
2	175	100	240	196	260	409	
3	111	115	210	233	314	451	
4	128	146	199	207	309	405	
5	131	99	187	227	317	395	
6	109	103	166	219	297	386	
7	107	87	213	199	300	401	
8	200	117	215	178	205	412	
9	96	89	226	185	313	407	
10	67	90	201	203	313	378	
<i>Total</i>							

SUBTRACTION

108. EXAMPLE: An elementary school has 1,405 pupils; 735 are in the primary department. How many are there in the rest of the school?

Find the difference between 1,405 and 735.

5 units from 5 units are 0 units.

3 tens from 10 tens are 7 tens.

7 hundreds from 13 hundreds are 6 hundreds.

Or, we may think 5 and 0 are 5; 3 and 7 are 10; 7 and 6 are 13.

1405 Minuend

735 Subtrahend

670 Difference

Test: $670 + 735 = 1405$.

There are 670 pupils in the rest of the school.

109. Subtraction is taking one number from another. The number subtracted is called the **subtrahend**.

The number from which we subtract is called the **minuend**.

The result of subtraction is called the **difference** or **remainder**.

WRITTEN EXERCISES

1. The lengths of the following branches of the Mississippi are:

Missouri, 3,100 mi.

Red, 1,600 "

Arkansas, 2,000 "

Cumberland, 650 "

Wabash, 550 mi.

Illinois, 350 "

Alleghany, 350 "

Minnesota, 425 "

How many miles longer is the Missouri than the Red? The Red than the Minnesota?

2. How many miles longer is the Cumberland than the Alleghany? Than the Wabash?

3. The table shows the sales and the expenses of a stationer per month for a year. Find for each month how much greater his sales are than his expenses:

MONTH	<i>Sales</i>	<i>Expenses</i>
Jan.	\$625.	\$212.
Feb.	763.25	210.50
March	708.50	205.
April	1,200.75	199.65
May	1,100.35	198.25
June	900.20	215.10

MONTH	<i>Sales</i>	<i>Expenses</i>
July	\$760.75	\$181.50
Aug.	813.80	200.
Sept.	946.45	213.58
Oct.	2,580.15	210.41
Nov.	1,433.90	199.33
Dec.	1,020.40	205.50

4. The following table shows the money deposited and the money drawn out at a bank for each day of one week. Find the difference between the amount deposited and the amount withdrawn each day:

DAY	<i>Deposited</i>	<i>Withdrawn</i>	<i>Difference</i>
Mon.	\$35,673.25	\$3,280.33	
Tues.	8,410.63	4,354.27	
Wed.	10,209.77	6,026.15	
Thurs.	17,048.13	7,118.19	
Fri.	20,104.36	5,769.47	
Sat.	7,863.45	12,267.80	

5. On which day was the money drawn more than that deposited? How much more? Subtract this difference from the sum of the other differences to find how much was left in the bank.

REVIEW AND PRACTICE

ORAL EXERCISES

1. Beginning at the right, name in order the first six places in a whole number.

2. How many periods in 325638? Read the number.

3. Read: MCM; CDCCV; MCCCLXXXVIII.

4. Add 10 to 825. 30 to 825. 50 to 735.

5. Subtract 10 from 855. 20 from 855. 50 from 855.

6. Subtract 100 from 765. 300 from 625. 500 from 934.

WRITTEN EXERCISES

1. Copy these numbers and, using commas, divide them into units' and thousands' periods.

1683	2100	31600	55280	191451
7404	1069	23290	61760	684770

Add and test:

2. 125	4. 405	6. 125	8. 842
632	909	861	963
805	444	745	555
729	838	321	890
<u>638</u>	<u>265</u>	<u>459</u>	<u>777</u>
3. 222	5. 444	7. 1009	9. 545
<u>888</u>	<u>777</u>	<u>909</u>	<u>454</u>

Subtract and test :

10. \$1000 <u>367</u>	13. \$1000 <u>999</u>	16. \$8888 <u>999</u>	19. \$1005 <u>555</u>
11. 65207 <u>8910</u>	14. 48305 <u>7869</u>	17. 35008 <u>19864</u>	20. 60904 <u>34568</u>
12. 20432 <u>9977</u>	15. 165089 <u>10853</u>	18. 463097 <u>129867</u>	21. 1111111 <u>999999</u>

Solve :

22. The numbers in the diagram show the miles between the places named. Find the distance from Boston to Chicago.



23. A man paid \$2,025 for a house and \$375 for furniture. How much did he pay for all?

24. A man's income one year was \$1,800; the next year, \$1,235; and the third year, \$1,306. What was his total income for the 3 years?

25. The Hawaiian Islands contain 6,740 sq. mi.; and Porto Rico, 3,600 sq. mi. How much larger is the area of the Hawaiian Islands than that of Porto Rico?

26. Denver, Colorado, is 5,175 ft. above sea-level; and Chicago, Illinois, 590 ft. Denver is how many feet higher than Chicago?

27. A bank received in one day \$45,500, and paid out \$37,985. What was the difference?

MULTIPLICATION

Multipliers of One Figure

110. EXAMPLE: A field contains 8 rows of 423 celery plants each. How many plants are in the field?

Multiply 423 by 8.

423 Multiplicand	$8 \times 3 \text{ units} = 24 \text{ units.}$
8 Multiplier	$8 \times 2 \text{ tens} = 16 \text{ tens.}$
	$16 \text{ tens} + 2 \text{ tens} = 18 \text{ tens.}$
3384 Product	$8 \times 4 \text{ hundreds} = 32 \text{ hundreds.}$
	$32 \text{ hundreds} + 1 \text{ hundred} = 33 \text{ hundreds.}$

There are 3,384 plants in the field.

111. Multiplication is taking the same number as an addend a given number of times.

The number by which we multiply is called the **multiplier**.

The number multiplied is called the **multiplicand**.

The result of multiplication is called the **product**.

WRITTEN EXERCISES

Multiply :

1. 105	4. 1166	7. 4505	10. 5529	13. 1948
9	9	6	8	5
2. 1285	5. 7707	8. 3712	11. 2520	14. 6581
3	7	4	6	4
3. 4280	6. 1875	9. 4495	12. 4565	15. 10808
8	9	7	5	5

112. EXAMPLE: Children's coats sold on bargain day at \$4.23 each. What did 8 coats cost?

Multiply \$4.23 by 8.

	$8 \times 3\phi = 24\phi = 2 \text{ dimes} + 4\phi.$ Write 4.
\$4.23 Multiplicand	$8 \times 2 \text{ dimes} = 16 \text{ dimes.}$
8 Multiplier	$16 \text{ dimes} + 2 \text{ dimes} = 18 \text{ dimes}$
	$= \$1 + 8 \text{ dimes.}$ Write 8.
\$33.84 Product	$8 \times \$4 = \$32.$
	$\$32 + \$1 = \$33.$ Write 33.
	Then, $8 \times \$4.23 = \$33.84.$

8 coats cost \$33.84.

In writing amounts of money, what numbers does the decimal point separate? Why is it placed between 3 and 8 in the result above?

WRITTEN EXERCISES

Multiply :

- | | | | |
|------------|------------|------------|------------|
| 1. \$2.06 | 3. \$12.49 | 5. \$30.63 | 7. \$40.05 |
| 7 | 8 | 4 | 6 |
| | | | |
| 2. \$18.89 | 4. \$4.85 | 6. \$80.16 | 8. \$19.55 |
| 5 | 8 | 9 | 6 |
| | | | |

Solve :

9. What is the cost of 6 desks at \$3.75 each?
10. What is the cost of 7 hat-racks at \$12.25 each?
11. What is the cost of 8 Dictionaries at \$9.50 each?
12. It cost \$1.35 a sq. yd. to make a blackboard. What was the cost of 9 sq. yd.?
13. What do 6 pairs of skates cost at \$1.60 a pair?
14. What is the cost of 8 sleds at \$2.25 each?

Multipliers of Two Figures

113. PREPARATORY.

1. $10 \times 4 = ()?$ $10 \times 5 = ()?$ $20 \times 4 = ()?$
 $20 \times 5 = ()?$

2. How is any integer multiplied by 10? 20 is how many times 10?

3. To multiply by 20 is to multiply by 10 and by what other number?

4. Multiply by 20: 3; 18; 25; 122; 260; 700.

5. Multiply by 30: 3; 5; 8; 7; 4; 9; 16; 45; 61.

114. EXAMPLE: A trolley car ran 87 mi. a day. How many miles did it run in 35 days?

Multiply 87 by 35:

87 35 ——— 435 2610 ——— 3045	To multiply 87 by 35 is to multiply it by 5 plus 30. What is the result of multiplying it by 5? How is it multiplied by 30? What is this result? What is the sum of these results? Does the zero at the right in the result of the second multiplication (2610) change the product? This place, then, we leave blank.
---	---

The car ran 3,045 mi. in 35 days.

WRITTEN EXERCISES

Multiply:

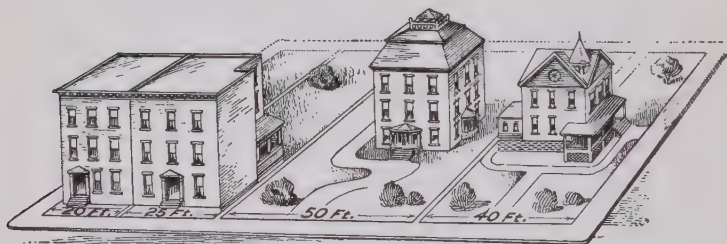
1. 84	3. 565	5. 218	7. 60	9. 693	11. 565
12	32	14	12	56	48
———	———	———	———	———	———
2. 135	4. 744	6. 163	8. 276	10. 335	12. 299
11	14	17	34	66	33
———	———	———	———	———	———

The prices of city building lots are usually stated as a certain amount per foot, and the number of feet as the length of the lot along the street.

For example, a lot extended 50 ft. along a street (that is, had a frontage of 50 ft.) and was sold for \$20 a ft. The lot sold for $50 \times \$20$, or \$1000.

To prevent misunderstanding, the price is usually stated to be per front foot.

A lot with a frontage of 30 ft. is called a 30-foot lot.



Solve :

13. What is the width of the lot at the right? What did it cost at \$22 per front ft.?

14. What is the width of each lot in the two at the left? What did each cost at \$18 per front ft.?

15. What is the width of the second lot from the right? What did it cost at \$12 per front ft.?

16. What is the area of a plot 16 yd. wide and 35 yd. long?

17. What is the value of a block of land containing 10 lots of 66 ft. each, at \$24 per front ft.? At \$35 per front ft.?

DIVISION

Divisors of One Figure

115. EXAMPLE: 45 boys have chosen sides for a game. How many boys are there on a side?

Divide 45 by 2.

$$\begin{array}{r} \text{Quotient} \\ 22 \\ 2 \overline{) 45} \text{ and 1 over} \\ \text{Divisor } \overline{\text{Dividend}} \end{array}$$

2 is contained in 40 twenty times ($20 = 2$ tens). We write 2 in tens' place.
2 is contained in 5 two times, with one left undivided. We write 2 in units' place.

Test: $2 \times 22 + 1 = 45$.

There are 22 boys on a side, and one boy is left out.

116. Division is finding how many times one number is contained in another.

The number divided is called the **dividend**.

The number by which we divide is called the **divisor**.

The number left undivided is called the **remainder**.

117. EXAMPLE: A farmer had 45 bu. of grain in two equal bins. How many bushels were there in each bin?

Divide 45 by 2.

$$\begin{array}{r} \text{Quotient} \\ 22 + \frac{1}{2}, \text{ or } 22\frac{1}{2} \\ 22 \overline{) 45} \\ \text{Divisor } \overline{\text{Dividend}} \end{array}$$

We express the division of the remainder 1 by the fraction $\frac{1}{2}$ and place it in the quotient.

Test: $2 \times 22 + 2 \times \frac{1}{2} = 45$.

There were $22\frac{1}{2}$ bu. in each bin.

WRITTEN EXERCISES

Divide and find the remainder :

- | | | | |
|------------------------|-------------------------|-------------------------|-------------------------|
| 1. $3\overline{)40}$ | 8. $4\overline{)46}$ | 15. $3\overline{)79}$ | 22. $5\overline{)78}$ |
| 2. $8\overline{)169}$ | 9. $4\overline{)126}$ | 16. $5\overline{)108}$ | 23. $3\overline{)187}$ |
| 3. $5\overline{)168}$ | 10. $6\overline{)207}$ | 17. $7\overline{)234}$ | 24. $9\overline{)199}$ |
| 4. $7\overline{)356}$ | 11. $6\overline{)196}$ | 18. $8\overline{)253}$ | 25. $5\overline{)289}$ |
| 5. $8\overline{)728}$ | 12. $9\overline{)909}$ | 19. $7\overline{)497}$ | 26. $6\overline{)696}$ |
| 6. $8\overline{)429}$ | 13. $7\overline{)148}$ | 20. $9\overline{)910}$ | 27. $6\overline{)635}$ |
| 7. $5\overline{)5126}$ | 14. $5\overline{)5863}$ | 21. $4\overline{)1816}$ | 28. $4\overline{)8919}$ |

Solve :

29. A gardener set out plants 4 in a row. In how many rows did he set 138 plants? How many plants were left?

30. How many 3-bushel barrels can be filled from 173 bu. of apples? How many bushels are left?

31. With 98 pupils a teacher made 3 equal classes, and had 2 pupils left over. How many in each class?

32. How many hours does it take a coach traveling at the rate of 6 mi. an hour to go 133 mi.?

33. If a street car travels 138 mi. in 9 hr., how many miles does it go per hour?

34. If an automobile travels from New York to Albany, 143 mi. in 8 hr., what is its rate per hour?

35. How many miles per hour does a motor-boat travel that goes 126 mi. in 6 hr.?

36. From 79 boys are made 5 equal groups as large as possible. How many boys in each group and how many left over?

37. A gardener had 279 plants to set in 8 equal rows. How many plants did he set in each row, and how many had he left?

38. A farmer put $\frac{1}{4}$ of 286 bu. of grain into a bin. How many bushels did he put into the bin?

39. $\frac{1}{3}$ of a flock of 279 sheep were sold. How many were sold?

118. EXAMPLE: The amount of a hardware bill was \$19.85, of which $\frac{1}{5}$ was profit. What was the profit?

Find $\frac{1}{5}$ of \$19.85, or divide \$19.85 by 5.

\$19 = 5 \times \$3 and \$4 besides.

The \$4 left to be divided and the 8 dimes of the given amount make 48 dimes.

$$\begin{array}{r} \$3.97 \\ 5 \overline{) \$19.85} \end{array}$$

48 dimes = 5 \times 9 dimes and 3 dimes besides.

The 3 dimes left and the 5 cts. of the given amount make 35 cts. 35 cts. = 5 \times 7 cts.

Test: 5 \times \$3.97 = \$19.85.

The profit was \$19.85.

The solution may be written: $\frac{1}{5}$ of \$19.85 = \$3.97; or, \$19.85 \div 5 = \$3.97.

WRITTEN EXERCISES

Divide and test:

1. $5 \overline{) \$36.50}$

5. $9 \overline{) \$45.90}$

9. $8 \overline{) \$36.24}$

2. $7 \overline{) \$49.49}$

6. $6 \overline{) \$18.36}$

10. $6 \overline{) \$24.48}$

3. $5 \overline{) \$5.55}$

7. $5 \overline{) \$10.00}$

11. $3 \overline{) \$66.60}$

4. $4 \overline{) \$96.04}$

8. $8 \overline{) \$64.32}$

12. $7 \overline{) \$14.49}$

Solve:

13. If a man earns \$25.20 per week and pays $\frac{1}{6}$ of his earnings for board, how many dollars does his board cost him? If he saves $\frac{1}{4}$ of his earnings, how many dollars does he save?

14. A week's pay for 8 men receiving equal salaries is \$70.80. What is the weekly salary of each?

15. A farmer had \$75, and spent $\frac{1}{5}$ of it for a plow. How much did the plow cost? He spent twice as much for a roller. Altogether, how much did he spend?

16. The pay-roll of a department having 7 employees is \$98.70 a week. How much is paid to each employee?

17. When Charles has read $\frac{1}{8}$ of a 200-page book, how many pages has he left to read?

18. A machinist earned \$144 a month and paid $\frac{1}{9}$ of it for rent and $\frac{4}{9}$ of it for other bills. How many dollars did he pay for rent? For other bills?

19. A well 96 ft. deep goes through rock $\frac{1}{8}$ of the way. What did it cost to bore the well at \$1 a ft. for rock and \$ $\frac{1}{4}$ a ft. for the rest?

20. One day's sales in a department store amounted to \$1,266.30, of which $\frac{1}{5}$ was received by the book department, and $\frac{1}{3}$ by the dry-goods department. How much was received by the other departments altogether?

21. A contractor received \$1,762.40 for paving a street; $\frac{1}{8}$ of this was profit. How many dollars did he make?

22. A dealer shipped 969 tons of coal, $\frac{1}{6}$ of which was soft coal. How many tons were hard coal?

23. A house and lot cost \$2,870; $\frac{1}{4}$ of this was the cost of the lot. What was the cost of the house?

24. A dealer gave an order for 4-dollar cameras. The bill was \$576. How many cameras did he buy?

Divisors of Two Figures

119. EXAMPLE: How many dozen cans of peas are there in a lot of 566 cans?

Divide 566 by 12.

$ \begin{array}{r} \text{(1)} \\ \begin{array}{r} 4 \text{ tens} + \qquad \qquad \qquad 7 \text{ units} \\ \hline 12 \overline{) 56 \text{ tens} + 6 \text{ units}} \\ \underline{48 \text{ tens}} \\ 8 \text{ tens} + 6 \text{ units} = 86 \text{ units} \\ \underline{84 \text{ units}} \\ 2 \text{ units} \end{array} \end{array} $	or	$ \begin{array}{r} \text{(2)} \\ \begin{array}{r} 47\frac{1}{6} \\ \hline 12 \overline{) 566} \\ \underline{48} \\ 86 \\ \underline{84} \\ 2 \end{array} \end{array} $
---	----	---

We know that 12 times 5 (60) is more than 56, and that 12 times 4 (48) is less than 56. Then, $56 \text{ tens} \div 12 = 4 \text{ tens}$ and a remainder. We write 4 tens in the quotient.

Subtracting 48 tens from 56 tens, 8 tens are left; with the 6 units they make 86 units.

12 times 8 (96) is more than 86, and 12 times 7 (84) is less than 86. Then, $86 \text{ units} \div 12 = 7 \text{ units}$ and a remainder. We write 7 units in the quotient.

Subtracting 84 units from 86 units, 2 units are left.

The division of the remainder may be shown by the fraction $\frac{2}{12}$, or $\frac{1}{6}$; and the quotient may be written $47\frac{1}{6}$.

Test: $12 \times 47 + 2 = 566$.

There are $47\frac{1}{6}$ dozen cans.

When you cannot see at once what figure should be placed in the quotient, try the figure that seems correct. If the figure

taken is too large, the number to be subtracted will be larger than that from which it is to be subtracted. Try a smaller figure. If the figure is too small, the difference in the subtraction will be larger than the divisor. In this case take a larger figure in the quotient.

In practice, use the form (2) in the calculation on page 191.

WRITTEN EXERCISES

Divide and test :

- | | | | |
|--------------------------|--------------------------|--------------------------|---------------------------|
| 1. $14 \overline{)728}$ | 4. $43 \overline{)4011}$ | 7. $63 \overline{)1260}$ | 10. $99 \overline{)1089}$ |
| 2. $26 \overline{)1763}$ | 5. $34 \overline{)9066}$ | 8. $81 \overline{)2430}$ | 11. $76 \overline{)9763}$ |
| 3. $19 \overline{)4819}$ | 6. $55 \overline{)865}$ | 9. $97 \overline{)4850}$ | 12. $35 \overline{)1225}$ |

Solve :

13. How many cars holding 45 tons can be loaded from 512 tons of coal? How many tons will be left?

14. How many 18-ton carloads, and how many tons besides are there in 311 tons of cabbage?

15. If 38 men working for the same wages earn \$76 per day, what does one man earn per day? What do 30 men earn?

16. If 19 hats cost \$47.50, what does 1 hat cost? How many can be bought for \$12.50?

17. If 2 doz. pairs of gloves cost \$28.08, what is the price per pair? What is the cost of 68 pairs?

18. If shoes cost \$15 per case of 12 pairs, what is the price per pair?

19. If 61 copies of a book cost \$50.63, what is the price per copy? What is the cost of 75 copies?

REVIEW AND PRACTICE

WRITTEN EXERCISES

Multiply :

$$\begin{array}{r} 1. \ \$1.36 \\ \quad 9 \\ \hline \end{array}$$

$$\begin{array}{r} 4. \ \$2.25 \\ \quad 8 \\ \hline \end{array}$$

$$\begin{array}{r} 7. \ \$4.10 \\ \quad 7 \\ \hline \end{array}$$

$$\begin{array}{r} 10. \ \$3.26 \\ \quad 6 \\ \hline \end{array}$$

$$\begin{array}{r} 2. \ 631 \\ \quad 13 \\ \hline \end{array}$$

$$\begin{array}{r} 5. \ 538 \\ \quad 27 \\ \hline \end{array}$$

$$\begin{array}{r} 8. \ 430 \\ \quad 12 \\ \hline \end{array}$$

$$\begin{array}{r} 11. \ 662 \\ \quad 15 \\ \hline \end{array}$$

$$\begin{array}{r} 3. \ 762 \\ \quad 78 \\ \hline \end{array}$$

$$\begin{array}{r} 6. \ 891 \\ \quad 44 \\ \hline \end{array}$$

$$\begin{array}{r} 9. \ 805 \\ \quad 33 \\ \hline \end{array}$$

$$\begin{array}{r} 12. \ 465 \\ \quad 17 \\ \hline \end{array}$$

Divide :

$$13. \ 6 \overline{)156}$$

$$16. \ 7 \overline{)399}$$

$$19. \ 8 \overline{)736}$$

$$22. \ 3 \overline{)6225}$$

$$14. \ 8 \overline{)504}$$

$$17. \ 4 \overline{)916}$$

$$20. \ 5 \overline{)606}$$

$$23. \ 9 \overline{)828}$$

$$15. \ 5 \overline{)825}$$

$$18. \ 9 \overline{)810}$$

$$21. \ 7 \overline{)639}$$

$$24. \ 7 \overline{)343}$$

$$25. \ 12 \overline{)1464}$$

$$28. \ 16 \overline{)4832}$$

$$31. \ 5 \overline{)\$16.55}$$

$$26. \ 21 \overline{)6342}$$

$$29. \ 64 \overline{)1284}$$

$$32. \ 7 \overline{)\$50.47}$$

$$27. \ 35 \overline{)7356}$$

$$30. \ 75 \overline{)3775}$$

$$33. \ 4 \overline{)\$80.64}$$

Solve :

34. What is the cost of 75 ft. of rope at 3 cts. a ft. ?

35. A church contains 165 pews, each seating 4 persons. How many persons can be seated in the church ?

36. The rents from the first floor of a building are \$225 a week ; from the second floor, \$175 ; from the third, \$100. What is the total received per month ?

37. How many yards are there in the distance around a rectangular park 240 yd. long and 180 yd. wide?

38. If a stone walk costing \$2 for every yard of length is built around the park of Exercise 37, how many dollars will it cost?

39. The owner of a building contracted for 20 tons of coal per month for 6 months, at \$7.20 per ton. The market price of coal during these months, was \$6.50, \$7, \$7.60, \$7.40, \$6, \$5.80. Did the owner gain or lose, and how much?

40. The following are wholesale prices of fruits:

California prunes, 6 lb. for \$1.	Apples in 25-lb. lots,	\$3.50.
Pears, 6 lb. for \$1.	Apricots in 25-lb. lots,	\$4.75.
Peaches, 9 lb. for \$1.	Currants in 20-lb. boxes,	\$4.00.
Plums, 7 lb. for \$1.	Raisins in 50-lb. boxes,	\$4.75.

What price per pound does the customer pay for each of the above articles at the rate quoted?

41. A retail grocer buys 275 lb. of apples. How much do the apples cost?

42. He buys also 216 lb. of pears, 497 lb. of plums, and 90 lb. of currants. How much do these cost?

43. A dealer bought 75 lb. of apples; he sold 45 lb. at 18 cts. a lb., and the rest at 16 cts. a lb. How much did he make?

Find the price per dozen, if:

44. 16 doz. lemons cost \$4.96.

45. 59 doz. cans of corn cost \$53.10.

46. 15 doz. cans of dried beef cost \$18.

47. 45 doz. cans of tomatoes cost \$48.60.

SPECIAL MULTIPLES: 10, 100, 11, 12, 15.

Multiplication and Division by 10

120. PREPARATORY.

1. Write the multiples of 10 from 10 to 200.
2. With what figure do all of these multiples end?
3. 40 is how many times 4? 70 is how many times 7? Place a zero at the right of 13. The result is how many times 13?
4. By what number is 4 multiplied by placing 0 at the right?

121. *To multiply a whole number by 10, place a 0 at the right.*

122. PREPARATORY.

1. How many tens in 20? In 30? In 50? 90?
2. How many tens in 110? 140? 1000? 1,500?
3. By what number is 90 divided if we remove the zero?

123. *To divide a multiple of 10 by 10, omit a 0 from the right.*

ORAL EXERCISES

Multiply :

1. 10×7 . 3. 10×13 . 5. $\$80 \times 10$. 7. $\$50 \times 10$.
2. 10×36 . 4. 10×75 . 6. $\$110 \times 10$. 8. $\$100 \times 10$.

9. 10×9 . 11. 10×15 . 13. $\$103 \times 10$. 15. $\$550 \times 10$.
 10. 10×70 . 12. 10×20 . 14. $\$17 \times 10$. 16. $\$608 \times 10$.

Divide:

17. $\$9,800 \div 10$. 20. $660,350 \div 10$. 23. $\$9,490 \div 10$.
 18. $1,290 \div 10$. 21. $115,520 \div 10$. 24. $\$9,900 \div 10$.
 19. $1,050 \div 10$. 22. $\$17,600 \div 10$. 25. $40,040 \div 10$.

Solve:

26. 500 bu. of potatoes are divided into 10 equal parts. How many bushels are there in each part?

27. If a machine threshes 90 bu. of barley in a day, how many bushels will it thresh in 10 days? In 50 days?

28. An orchard contains 45 rows of trees with 10 trees in a row. How many trees are there?

29. If a military company contains 100 men, how many men are there in $\frac{1}{10}$ of the company?

Multiplication and Division by 100.

124. PREPARATORY.

1. Count by 100's to 1000. How many hundreds in 1000.

2. How many hundreds are there in 1,200?

3. By what number is 15 multiplied by placing 00 at the right?

4. What is $\frac{1}{100}$ of a dollar? What is $\frac{1}{100}$ of \$10, or of 1000 cents?

5. What is $\frac{1}{100}$ of 1,200 cents? $\frac{1}{100}$ of 1,200?

125. *To multiply a whole number by 100, place two zeros at the right.*

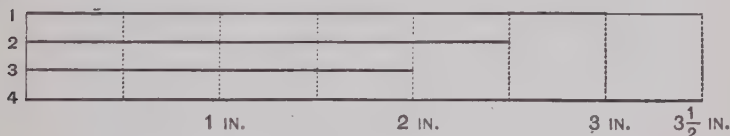
126. *To divide a multiple of 100 by 100, omit two zeros from the right.*

ORAL EXERCISES

1. $100 \times 8 = ()?$ $100 \times 29 = ()?$

$100 \times 76 = ()?$ $100 \times 35 = ()?$

2. If 1 space represents 100 mi., how many miles are represented by each of the following lines?



3. If 100 mi. are represented by 1 in., give the lengths of the lines that would represent the lengths of the following rivers:

Amazon, 3,300 mi.

Rhine, 400 mi.

Mississippi, 2,300 "

Seine, 700 "

St. Lawrence, 1,100 "

Hudson, 300 "

Columbia, 1000 "

Thames, 220 "

4. What is the cost of 100 sq. ft. of cement walk at \$.17 per sq. ft.?

5. What is the cost of 10 harnesses at \$43.75 each?

6. What is the cost of 100 ft. of copper wire at 3 cts. a ft.? What is the cost of 500 ft.? Of 100 yd.?

7. What is the cost of 100 Geographies at \$.70 each? What is the cost of 300? Of 500? Of 900?

8. What is the cost of 20 typewriters at \$60 each?

9. When 200 barrels (bbl.) of apples cost \$400, what is the cost of 1 bbl. at the same rate? Of 40 bbl.?

10. A merchant sold 100 tops at \$.05 apiece, 100 balls at \$.10 each, and 10 kites at \$.25 each. What was the amount received from each sale? From all?

11. A man sold \$3,650 worth of goods and received $\frac{1}{10}$ of the amount for selling them. How many dollars did he receive?

12. Mary bought 10 yd. of linen at \$.75; 100 skeins of silk at \$.03 a skein; and 10 yd. of ribbon at \$.36 a yd. How much did she pay for each purchase? How much did she pay for all?

Multiplication and Division by 11, 12, 15

TABLES

$1 \times 11 = 11$	$1 \times 12 = 12$	$1 \times 15 = 15$
$2 \times 11 = 22$	$2 \times 12 = 24$	$2 \times 15 = 30$
$3 \times 11 = 33$	$3 \times 12 = 36$	$3 \times 15 = 45$
$4 \times 11 = 44$	$4 \times 12 = 48$	$4 \times 15 = 60$
$5 \times 11 = 55$	$5 \times 12 = 60$	$5 \times 15 = 75$
$6 \times 11 = 66$	$6 \times 12 = 72$	$6 \times 15 = 90$
$7 \times 11 = 77$	$7 \times 12 = 84$	$7 \times 15 = 105$
$8 \times 11 = 88$	$8 \times 12 = 96$	$8 \times 15 = 120$
$9 \times 11 = 99$	$9 \times 12 = 108$	$9 \times 15 = 135$
$10 \times 11 = 110$	$10 \times 12 = 120$	$10 \times 15 = 150$
$11 \times 11 = 121$	$11 \times 12 = 132$	$11 \times 15 = 165$
	$12 \times 12 = 144$	$12 \times 15 = 180$
		$13 \times 15 = 195$
12 dozen (doz.) is called a <i>gross</i> (<i>gr.</i>)		$14 \times 15 = 210$
		$15 \times 15 = 225$

ORAL EXERCISES

1. What is the cost of 10 articles at 11 cts. each?
2. What is the cost of 11 articles at 12 cts. each?
3. What is the cost of 12 articles at \$12 each?
4. What is the cost of 15 articles at 14 cts. each?
5. What is the area of a rectangle 13 ft. by 15 ft.?

WRITTEN EXERCISES

Divide:

- | | | |
|--------------------------|--------------------------|---------------------------|
| 1. $11 \overline{)1210}$ | 4. $11 \overline{)1760}$ | 7. $11 \overline{)253}$ |
| 2. $12 \overline{)1728}$ | 5. $12 \overline{)2760}$ | 8. $12 \overline{)36108}$ |
| 3. $15 \overline{)3090}$ | 6. $15 \overline{)3495}$ | 9. $15 \overline{)22575}$ |

Solve:

10. What is the cost of 21 articles when 15 cost \$210?
11. What is the cost of 32 articles when 12 cost \$1.32?
12. What is the cost of 40 articles when 13 cost \$1.95?
13. How many single things in a gross? 3 doz. are what part of a gross? 36 are what part of a gross?
14. 8 doz. are what part of a gross? 96 are what part of a gross?
15. How many square yards in a lawn 12 yds. wide and 14 yds. long?
16. A car 14 ft. wide contained 2,114 sq. ft. What was the length of the car?

FRACTIONS

127. PREPARATORY.

1. If we divide an apple into four equal parts and give three of the parts away, what fraction of the apple have we given away?

2. In the fraction $\frac{3}{4}$ what does the 3 above the line tell? What does the 4 below the line tell?

3. In the fraction $\frac{5}{8}$ what does the 5 above the line tell? The 8 below the line?

128. One or more of the equal parts of a whole thing is called a **fraction**.

The number below the line shows the number of parts into which the unit has been divided, and is called the **denominator** (*namer*).

The number above the line shows the number of parts expressed by the fraction and is called the **numerator** (*numberer*).

ORAL EXERCISES

Read the numerators and the denominators of these fractions:

1. $\frac{3}{4}$. 2. $\frac{1}{8}$. 3. $\frac{5}{7}$. 4. $\frac{1}{10}$. 5. $\frac{1}{16}$. 6. $\frac{5}{6}$.

129. PREPARATORY.

1. Two halves are how many whole things?
2. Four fourths are how many whole things?
3. Name the numerator and the denominator in $\frac{2}{2}$.
In $\frac{4}{4}$.

4. What does the fraction equal when the *numerator equals the denominator*?

5. How many halves in one whole thing? Are three halves more or less than one whole?

6. Are four thirds more or less than one whole?

7. Which of these fractions are greater than one?

$$\frac{1}{3} \quad \frac{3}{2} \quad \frac{2}{3} \quad \frac{4}{3} \quad \frac{1}{5} \quad \frac{6}{5} \quad \frac{7}{10} \quad \frac{11}{10}$$

8. *When a fraction is greater than one*, which is the greater, the numerator or the denominator?

9. *When a fraction is less than one*, which is the greater, the numerator or the denominator?

130. A fraction less than 1 is called a **proper fraction**.

A fraction equal to, or greater than, 1 is called an **improper fraction**.

ORAL EXERCISES

1. Select the fractions equal to one:

$$\frac{3}{3} \quad \frac{8}{8} \quad \frac{7}{9} \quad \frac{15}{16} \quad \frac{12}{12} \quad \frac{7}{8} \quad \frac{10}{10}$$

2. Select the proper fractions:

$$\frac{7}{9} \quad \frac{7}{6} \quad \frac{4}{4} \quad \frac{3}{8} \quad \frac{9}{14} \quad \frac{49}{100} \quad \frac{16}{16} \quad \frac{55}{11}$$

3. Select the improper fractions:

$$\frac{6}{7} \quad \frac{7}{6} \quad \frac{9}{8} \quad \frac{9}{11} \quad \frac{15}{3} \quad \frac{8}{8} \quad \frac{16}{16} \quad \frac{125}{100}$$

131. PREPARATORY.

1. 4 halves, or $\frac{4}{2}$, are how many ones?

2. Eight fourths, or $\frac{8}{4}$, are how many ones?

3. Nine fourths, or $\frac{9}{4}$, are how many ones and how many fourths besides?

4. $\frac{11}{8}$ are how many ones and how many eighths?

5. $\frac{11}{8} = 1\frac{3}{8}$; $\frac{9}{4} = 2\frac{1}{4}$. $\frac{14}{3} = ()$? $\frac{15}{7} = ()$?

132. A number that consists of a whole number and a fraction is called a **mixed number**.

ORAL EXERCISES

Select the mixed numbers:

1. $3\frac{1}{7}$ 3. $8\frac{9}{10}$ 5. $1\frac{4}{5}$ 7. $1\frac{1}{2}$ 9. $33\frac{1}{3}$

2. 60 4. $\frac{9}{8}$ 6. $\frac{9}{10}$ 8. $1\frac{5}{8}$ 10. $\frac{10}{3}$

11. $1\frac{3}{8}$ are how many eighths?

12. 2 are how many fifths? $2\frac{4}{5}$ are how many fifths?

13. Express as an improper fraction:

$3\frac{1}{7}$ $8\frac{3}{10}$ $5\frac{3}{4}$ $2\frac{7}{8}$ $11\frac{1}{2}$ $9\frac{1}{4}$ $3\frac{1}{6}$

14. Express as a mixed number:

$\frac{10}{3}$ $\frac{15}{2}$ $\frac{40}{10}$ $\frac{30}{14}$ $\frac{17}{12}$ $\frac{11}{4}$ $\frac{13}{5}$

Reduction

133. PREPARATORY.

1. 3 books and 6 books are () books? 4 dollars and 5 dollars are () dollars?

2. 3 pencils and 4 pencils are 7 ()?

3. 3 tenths and 6 tenths are () tenths? 4 twelfths and 5 twelfths are () twelfths?

4. $\frac{3}{10} + \frac{6}{10} = ()$? $\frac{4}{12} + \frac{5}{12} = ()$?

In the problems above we have added together *pencils* and *pencils*, or *books* and *books*, or *tenths* and *tenths*. In each case the things we added were of the same kind.

5. 3 gallons (12 quarts) and 2 quarts are 14 ()?

6. 5 eighths and 3 fourths (6 eighths) are 11 ()?

We cannot add together gallons and quarts until we change the gallons to quarts. We cannot add fourths and eighths until we change the fourths to eighths.

7. To add $\frac{2}{3}$ and $\frac{1}{6}$ we express $\frac{2}{3}$ as sixths.

$$\frac{2}{3} + \frac{1}{6} = \frac{4}{6} + \frac{1}{6} = \frac{5}{6}.$$

8. Change $\frac{2}{3}$ to ninths and subtract $\frac{2}{9}$ from $\frac{2}{3}$.

$$\frac{2}{3} - \frac{2}{9} = \frac{6}{9} - \frac{2}{9} = \frac{4}{9}?$$

9. What part of a day is $\frac{1}{2}$ da. and $\frac{1}{3}$ da.?

$$\frac{1}{2} \text{ da.} = () \text{ sixths of a day?}$$

$$\frac{1}{3} \text{ da.} = () \text{ sixths of a day?}$$

$$\frac{3}{6} \text{ da.} + \frac{2}{6} \text{ da.} = () \text{ da.?}$$

ORAL EXERCISES

1. Change $\frac{3}{4}$ to eighths and add $\frac{5}{8}$ to it. Change the answer to a mixed number.

2. Change $\frac{2}{3}$ to ninths and add $\frac{2}{9}$ to it.

3. Change $\frac{1}{8}$ to sixteenths and state which is the larger, $\frac{1}{8}$ or $\frac{3}{16}$.

4. Which is the larger, $\frac{1}{5}$ or $\frac{3}{10}$? To what did you change $\frac{1}{5}$?

State which is the larger:

$$5. \frac{1}{2} \text{ or } \frac{1}{3}. \quad 7. \frac{3}{8} \text{ or } \frac{3}{4}. \quad 9. \frac{3}{4} \text{ or } \frac{3}{8}. \quad 11. \frac{5}{8} \text{ or } \frac{1}{2}.$$

$$6. \frac{2}{3} \text{ or } \frac{3}{4}. \quad 8. \frac{5}{6} \text{ or } \frac{2}{3}. \quad 10. \frac{1}{2} \text{ or } \frac{1}{3}. \quad 12. \frac{5}{8} \text{ or } \frac{1}{2}.$$

134. PREPARATORY.

1. $\frac{2}{3} = \frac{4}{6}$. By what were the numerator and denominator of the first fraction multiplied to make the second fraction?

2. $\frac{3}{4} = \frac{9}{12}$. By what were the numerator and the denominator of the first fraction multiplied to make the second fraction? By what must the numerator and the denominator of the second fraction be divided to make the first?

135. *The value of a fraction is unchanged if the numerator and the denominator are multiplied or divided by the same number.*

ORAL EXERCISES

Show that the fractions in each pair are equal:

1. $\frac{2}{4}$ and $\frac{1}{2}$.

3. $\frac{6}{8}$ and $\frac{3}{4}$.

5. $\frac{9}{12}$ and $\frac{3}{4}$.

2. $\frac{6}{9}$ and $\frac{2}{3}$.

4. $\frac{4}{12}$ and $\frac{1}{3}$.

6. $\frac{10}{12}$ and $\frac{5}{6}$.

136. When the terms of a fraction have been divided by the same number to form a fraction of smaller terms, the given fraction is said to be simplified, or reduced to lower terms.

When there is no number that will divide both terms without a remainder, the fraction is said to be reduced to its lowest terms.

EXAMPLES:

1. Reduce $\frac{10}{12}$ to its lowest terms:

$\frac{10}{12} \div 2 = \frac{5}{6}$ No number will divide both 5 and 6, so we say that $\frac{5}{6}$ has been reduced to its lowest terms.

2. Reduce $\frac{45}{60}$ to its lowest terms:

$$\frac{5)45}{5)60} = \frac{3)9}{3)12} = \frac{3}{4}$$

WRITTEN EXERCISES

Reduce to lowest terms :

- | | | | | |
|-----------------------|----------------------|------------------------|--------------------------|---------------------------|
| 1. $\frac{9}{12}$. | 5. $\frac{4}{16}$. | 9. $\frac{80}{100}$. | 13. $\frac{100}{1000}$. | 17. $\frac{25}{20}$. |
| 2. $\frac{28}{21}$. | 6. $\frac{36}{45}$. | 10. $\frac{5}{100}$. | 14. $\frac{10}{100}$. | 18. $\frac{50}{100}$. |
| 3. $\frac{75}{100}$. | 7. $\frac{10}{15}$. | 11. $\frac{18}{21}$. | 15. $\frac{500}{1000}$. | 19. $\frac{2500}{1000}$. |
| 4. $\frac{5}{10}$. | 8. $\frac{64}{50}$. | 12. $\frac{50}{100}$. | 16. $\frac{55}{100}$. | 20. $\frac{75}{100}$. |

Addition and Subtraction

137. *To add fractions having the same denominator, we add their numerators.*

Thus, $\frac{1}{5} + \frac{3}{5} = \frac{4}{5}$. $\frac{2}{4} + \frac{4}{4} = \frac{6}{4}$.

To add fractions whose denominators are not the same, we must change the fractions so that they have the same denominator.

138. If the sum of two or more fractions is an improper fraction, that is, a fraction equal to 1 or greater than 1, we turn it into 1 or into a mixed number.

Thus: $\frac{3}{8} + \frac{5}{8} = \frac{8}{8} = 1$.

$\frac{5}{8} + \frac{7}{8} = \frac{12}{8} = 1\frac{4}{8} = 1\frac{1}{2}$.

If the fraction in the answer is not in its lowest terms, we must reduce it.

Thus, in the sum above, $1\frac{4}{8} = 1\frac{1}{2}$.

ORAL EXERCISES

Add:

- | | | | |
|----------------------------------|----------------------------------|----------------------------------|------------------------------------|
| 1. $\frac{1}{2} + \frac{3}{4}$. | 4. $\frac{3}{4} + \frac{5}{8}$. | 7. $\frac{4}{5} + \frac{1}{2}$. | 10. $\frac{3}{4} + \frac{3}{8}$. |
| 2. $\frac{2}{3} + \frac{5}{6}$. | 5. $\frac{5}{8} + \frac{1}{2}$. | 8. $\frac{1}{4} + \frac{1}{3}$. | 11. $\frac{1}{6} + \frac{1}{4}$. |
| 3. $\frac{7}{8} + \frac{3}{4}$. | 6. $\frac{3}{4} + \frac{2}{3}$. | 9. $\frac{1}{2} + \frac{2}{3}$. | 12. $\frac{3}{10} + \frac{2}{5}$. |

Solve:

13. How much cloth is there in $\frac{1}{8}$ of a yard and $\frac{1}{2}$ of a yard?

14. How many days are there in the sum of $\frac{1}{2}$ day and $\frac{2}{3}$ days?

15. What part of an hour is $\frac{1}{3}$ of an hour and $\frac{1}{4}$ of an hour?

16. Add $\frac{3}{8}$ and $\frac{1}{8}$. Reduce the result to its lowest terms.

17. Add and reduce to lowest terms, $\frac{1}{12}$ and $\frac{5}{12}$.
Also $\frac{2}{15}$, $\frac{5}{15}$, $\frac{1}{15}$, and $\frac{4}{15}$.

WRITTEN EXERCISES

Add, reducing answers to lowest terms:

18. $\frac{3}{16} + \frac{1}{32}$. 21. $\frac{5}{9} + \frac{11}{18}$. 24. $\frac{1}{6} + \frac{11}{24}$. 27. $\frac{4}{9} + \frac{11}{27}$.

19. $\frac{5}{16} + \frac{9}{32}$. 22. $\frac{2}{5} + \frac{7}{20}$. 25. $\frac{3}{16} + \frac{9}{32}$. 28. $\frac{3}{10} + \frac{8}{20}$.

20. $\frac{3}{24} + \frac{7}{12}$. 23. $\frac{1}{3} + \frac{11}{12}$. 26. $\frac{4}{15} + \frac{17}{30}$. 29. $\frac{11}{12} + \frac{2}{3}$.

139. *To subtract fractions having the same denominator, we subtract their numerators. If the denominators are not the same, we must change the fractions so that they have the same denominator.*

Thus, $\frac{3}{4} - \frac{1}{6}$, is the same as $\frac{9}{12} - \frac{2}{12} = \frac{7}{12}$.

ORAL EXERCISES

Subtract:

1. $\frac{5}{10} - \frac{1}{2}$. 4. $\frac{5}{6} - \frac{2}{3}$. 7. $\frac{5}{8} - \frac{1}{4}$. 10. $\frac{7}{9} - \frac{2}{3}$.

2. $\frac{3}{4} - \frac{1}{2}$. 5. $\frac{2}{3} - \frac{1}{6}$. 8. $\frac{7}{8} - \frac{3}{4}$. 11. $\frac{5}{9} - \frac{1}{3}$.

3. $\frac{3}{8} - \frac{1}{4}$. 6. $\frac{3}{2} - \frac{3}{4}$. 9. $\frac{9}{10} - \frac{4}{5}$. 12. $\frac{4}{5} - \frac{3}{10}$.

13. Clara had $\frac{1}{2}$ of a dollar and spent $\frac{1}{4}$ of a dollar. What part of a dollar had she left?

WRITTEN EXERCISES

Subtract:

- | | | | |
|----------------------------------|----------------------------------|-----------------------------------|-------------------------------------|
| 1. $\frac{2}{3} - \frac{3}{5}$. | 4. $\frac{5}{8} - \frac{1}{3}$. | 7. $\frac{3}{8} - \frac{1}{16}$. | 10. $\frac{11}{12} - \frac{2}{3}$. |
| 2. $\frac{4}{5} - \frac{3}{4}$. | 5. $\frac{3}{8} - \frac{1}{5}$. | 8. $\frac{4}{7} - \frac{2}{5}$. | 11. $\frac{7}{8} - \frac{4}{5}$. |
| 3. $\frac{7}{8} - \frac{2}{3}$. | 6. $\frac{4}{5} - \frac{1}{6}$. | 9. $\frac{6}{7} - \frac{2}{3}$. | 12. $\frac{1}{12} - \frac{3}{4}$. |

Solve:

13. A man made $\frac{3}{8}$ of a trip by rail and $\frac{3}{16}$ by automobile. How much more of his trip was by rail than by automobile?

14. Mary used $\frac{9}{10}$ of a yd. of ribbon on one package and $\frac{5}{6}$ of a yd. on another. How much more did she use on the first package?

15. $\frac{7}{12}$ of a shipment was sold to one customer and $\frac{3}{8}$ to another. How much more was sold to the first?

Finding What Part One Number Is of Another

140. EXAMPLE: A ball team consists of 9 men, 6 of whom play on the infield. What part of the team is this?

1 man is $\frac{1}{9}$ of the team. 6 men are $\frac{6}{9}$ of the team.

$$\frac{6}{9} = \frac{2}{3}.$$

$\frac{2}{3}$ of the team play on the infield.

ORAL EXERCISES

- 8 is what part of 12? 7 is what part of 21?
- 9 is what part of 18? 6 is what part of 18?
- 12 is what part of 36? 10 is what part of 25?
- 8 is what part of 24? 15 is what part of 20?
- 8 is what part of 20? 16 is what part of 24?

WRITTEN EXERCISES

1. 20 qt. is what part of a bushel?
2. 24 qt. is what part of a bushel?
3. 12 oz. is what part of 2 lb.?
4. 12 in. is what part of a yard?
5. 18 in. is what part of a yard?

Addition and Subtraction of Mixed Numbers

141. In adding or subtracting mixed numbers, the whole numbers and the fractions are added or subtracted separately.

142. EXAMPLE: Two pieces of lace are $8\frac{2}{3}$ yd. and $11\frac{5}{6}$ yd. long. How many yards in both pieces?

$$\begin{array}{r}
 8\frac{2}{3} = 8\frac{4}{6} \\
 11\frac{5}{6} = 11\frac{5}{6} \\
 \hline
 \text{Sum} = 19\frac{9}{6} = 20\frac{3}{6} \\
 \phantom{\text{Sum}} = 20\frac{1}{2}
 \end{array}$$

If the fractions are unlike, they must first be reduced to the same denominator. An improper fraction in a sum should be reduced and added to the rest of the sum.

There are $20\frac{1}{2}$ yd. in both pieces.

WRITTEN EXERCISES

1. A man built $8\frac{3}{4}$ yd. of walk in front of his house and $30\frac{2}{3}$ yd. at the side. How many yards did he build?

Add:

$$\begin{array}{r}
 2. \quad 43\frac{7}{7} \\
 21\frac{3}{4} \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 3. \quad 19\frac{5}{6} \\
 8\frac{11}{12} \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 4. \quad 40\frac{8}{9} \\
 19\frac{2}{3} \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 5. \quad 70\frac{1}{2} \\
 30\frac{1}{8} \\
 \hline
 \end{array}$$

6. $19\frac{2}{3}$ <u>$46\frac{3}{4}$</u>	9. $41\frac{7}{8}$ <u>$89\frac{1}{4}$</u>	12. $40\frac{4}{7}$ <u>$60\frac{1}{14}$</u>	15. $120\frac{5}{6}$ <u>$63\frac{8}{9}$</u>
7. $85\frac{3}{5}$ <u>$91\frac{1}{4}$</u>	10. $96\frac{2}{3}$ <u>$140\frac{1}{6}$</u>	13. $98\frac{5}{6}$ <u>$77\frac{4}{5}$</u>	16. $188\frac{2}{5}$ <u>$260\frac{3}{4}$</u>
8. $56\frac{11}{12}$ <u>$90\frac{1}{3}$</u>	11. $63\frac{7}{12}$ <u>$49\frac{3}{4}$</u>	14. $108\frac{9}{10}$ <u>$180\frac{4}{5}$</u>	17. $37\frac{5}{7}$ <u>$803\frac{13}{14}$</u>

143. EXAMPLE: From a roll of cloth containing $45\frac{1}{2}$ yd., $18\frac{7}{8}$ yd. are cut. How many yards are left?

$$\begin{array}{r}
 45\frac{1}{2} = 44 + \frac{8}{8} + \frac{4}{8} = 44\frac{12}{8} \\
 18\frac{7}{8} \quad \quad \quad = 18\frac{7}{8} \\
 \hline
 \text{Difference} = 26\frac{5}{8}
 \end{array}$$

If the fraction in the minuend is smaller than that in the subtrahend, it must be increased by 1 from the whole number.

$26\frac{5}{8}$ yd. are left.

WRITTEN EXERCISES

Subtract:

1. $36\frac{1}{2}$ <u>$29\frac{1}{3}$</u>	4. $91\frac{1}{4}$ <u>$85\frac{3}{5}$</u>	7. $140\frac{1}{6}$ <u>$96\frac{2}{3}$</u>	10. $96\frac{3}{7}$ <u>$25\frac{1}{14}$</u>	13. $70\frac{1}{2}$ <u>$35\frac{5}{6}$</u>
2. $45\frac{5}{6}$ <u>$39\frac{1}{6}$</u>	5. $40\frac{1}{2}$ <u>$15\frac{2}{3}$</u>	8. $89\frac{1}{4}$ <u>$41\frac{7}{8}$</u>	11. $200\frac{1}{4}$ <u>$188\frac{2}{5}$</u>	14. $88\frac{1}{4}$ <u>$30\frac{5}{6}$</u>
3. $180\frac{9}{10}$ <u>$108\frac{4}{5}$</u>	6. $83\frac{1}{6}$ <u>$45\frac{3}{4}$</u>	9. $90\frac{8}{9}$ <u>$76\frac{2}{3}$</u>	12. $46\frac{3}{4}$ <u>$19\frac{2}{5}$</u>	15. $120\frac{5}{6}$ <u>$63\frac{8}{9}$</u>

Solve:

16. A field is 133 yd. long and $65\frac{1}{2}$ yd. wide. How many yards longer is it than wide?

17. One farm contained $150\frac{5}{8}$ acres and another $9\frac{3}{16}$ acres. How many acres more in the larger farm?

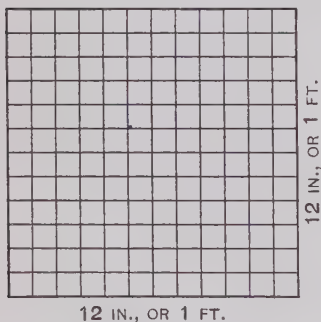
MEASUREMENT

Square Measure

144. PREPARATORY.

1. Draw a square one foot on a side. Mark each side at every inch.

2. Rule the square as shown in the picture.



3. What is the length and breadth of each small square?

4. How many square inches in the bottom row of squares? In each row of squares?

5. How many rows are there in the square?

6. 12×12 sq. in. = () sq. in.?

7. How many square inches in a square foot?

145. The common units for measuring area are the *square inch*, the *square foot*, and the *square yard*.

The *square rod* and the *acre* are used to measure land.

144 square inches (sq. in.) = 1 square foot (sq. ft.).

9 square feet = 1 square yard (sq. yd.).

$30\frac{1}{4}$ square yards = 1 square rod (sq. rd.).

160 square rods = 1 acre (A.).

WRITTEN EXERCISES

1. How many square inches of plate glass in a piece 1 ft. long and 2 ft. wide?

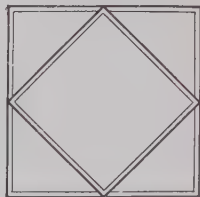
2. What part of a square foot of glass is a piece 4 in. square?

3. This window is 1 ft. square. The center square is half the whole window. How many square inches in the center square?

4. How many square inches in 2 sq. ft.? In 3 sq. ft.? In 4 sq. ft.? In 10 sq. ft.? In 5 sq. ft.?

5. A ball whose surface contained $\frac{3}{4}$ of a sq. ft. was gilded at 10 cts. per sq. in. What did the gilding cost?

6. How many square rods in 2 A.? In 3 A.? In 4 A.? In 10 A.? In 5 A.?



Find the number of square feet in each of the following :

7. 288 sq. in. 10. 216 sq. in. 13. 360 sq. in.

8. 432 sq. in. 11. 504 sq. in. 14. 72 sq. in.

9. 36 sq. in. 12. 108 sq. in. 15. 180 sq. in.

Find the number of acres in each of the following :

16. 80 sq. rd. 19. 320 sq. rd. 22. 400 sq. rd.

17. 40 sq. rd. 20. 360 sq. rd. 23. 440 sq. rd.

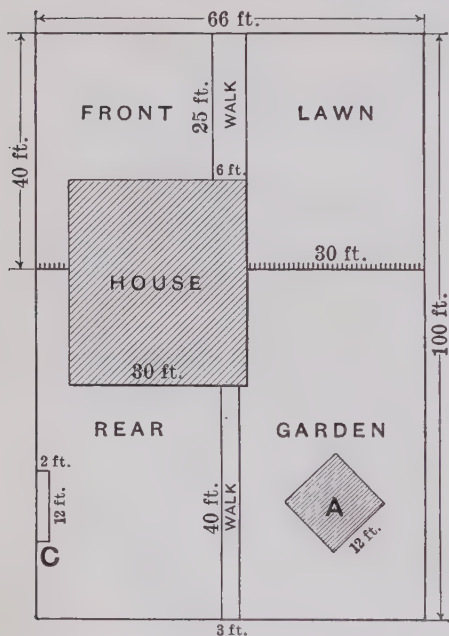
18. 120 sq. rd. 21. 140 sq. rd. 24. 540 sq. rd.

Solve :

25. A field contained 320 sq. rd. How many acres in the field?

26. A court contained 80 sq. rd. What part of an acre was this?

27. Find the length of this house from the length



of the lot and the lengths of the walks.

28. How many square feet are there in the ground-plan of the house?

29. How many yards long is the fence that separates the front lawn from the rear garden? What did it cost at \$35 per yd. of length?

30. How many square yards in each walk?

31. If the front walk is made of cement at \$.90 a sq. yd., what is its cost?

32. If the rear walk is built of wood at \$.18 per ft. of length, what is its cost?

33. A and C are flower-beds, A being square. Find how many square feet each occupies. How many square feet in both of them?

34. The bed A is fenced with woven wire 1 yd. wide. How many yards of wire in the fence? What did it cost at \$.15 a yd.?

Cubic Measure

146. PREPARATORY.

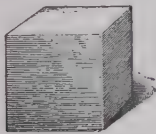


FIG. 1.

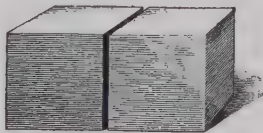


FIG. 2.

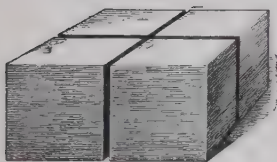


FIG. 3.

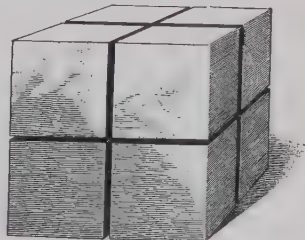


FIG. 4.

1. If Figure 2 represents two 1-inch cubes, how many 1-inch cubes does Figure 3 represent? Figure 4?

2. What are the length, breadth, and thickness of Figure 2? How many cubic inches in Figure 2?

$$2 \times 1 \text{ cubic inch (cu. in.)} = (\quad) \text{ cu. in.}$$

3. What are the length, breadth, and thickness of Figure 3? How many cubic inches in Figure 3?

$$2 \times 2 \times 1 \text{ cu. in.} = (\quad) \text{ cu. in.}$$

4. What are the length, breadth, and thickness of Figure 4? How many cubic inches are there in Figure 4?

$$2 \times 2 \times 2 \times 1 \text{ cu. in.} = (\quad) \text{ cu. in.}$$

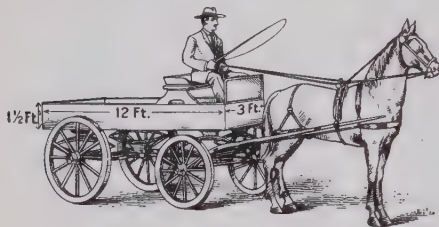
5. When the three numbers representing the length, breadth, and thickness are multiplied, what does the result express?

ORAL EXERCISES

1. How many cubic inches are there in the contents of a box 3 in. long, 2 in. high, and 2 in. wide?

2. How many 1-inch cubes are necessary to make a solid 9 in. long, 3 in. wide, and 4 in. high?

3. Walter has 100 one-inch cubes. When piled in a solid 10 in. long and 5 in. wide, how high is the solid?



4. How many 2-inch cubes in a block 4 in. by 6 in. by 8 in.?

5. Find the number of cubic feet in the capacity of this wagon box.

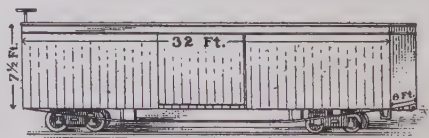
WRITTEN EXERCISES

1. A bin for grain was 12 ft. long, 8 ft. high, and 8 ft. wide. How many cubic feet did it hold?

2. What is the number of cubic feet contained in this freight car?

3. The cellar of a building was dug 100 ft. long, 55 ft. wide, and 11 ft.

deep. How many cubic feet of earth were removed?



4. How many times would the amount of earth found in Exercise 3 fill the wagon box shown in Exercise 5 above?

Find the volumes of these blocks:

	5.	6.	7.	8.	9.
Length	6 in.	34 in.	67 in.	30 in.	15 ft.
Breadth	8 "	5 "	32 "	4 "	5 "
Thickness	3 "	20 "	2 "	5 "	7 "

147. PREPARATORY.

1. How many square inches in 1 sq. ft.?

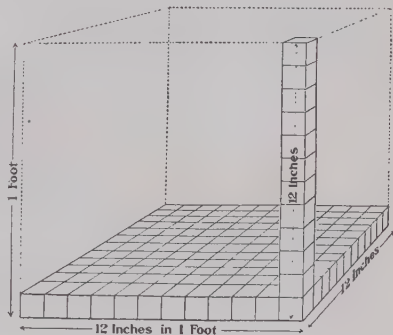
2. What is the size of the bottom of the cube as shown in the picture?

3. How many square inches does it contain? How many cubic inches are there in the layer of cubes on the bottom?

4. How many such layers will it take to fill the cubic foot?

5. Find 12×144 cu. in.

$$\underline{1,728 \text{ cubic inches} = 1 \text{ cubic foot.}}$$



WRITTEN EXERCISES

1. A drawer was 18 in. long, 8 in. wide, and 2 in. deep. How many cubic inches did it contain? What part of a cubic foot?

Find the number of cubic inches in :

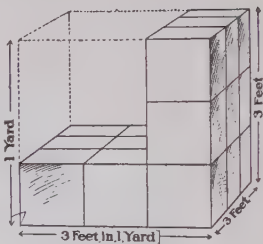
- | | | | |
|--------------------------|---------------------------|--------------------------|---------------------------|
| 2. $\frac{1}{2}$ cu. ft. | 4. $\frac{1}{6}$ cu. ft. | 6. $\frac{2}{3}$ cu. ft. | 8. $\frac{5}{6}$ cu. ft. |
| 3. $\frac{1}{4}$ cu. ft. | 5. $\frac{1}{12}$ cu. ft. | 7. $\frac{3}{4}$ cu. ft. | 9. $\frac{5}{12}$ cu. ft. |

148. PREPARATORY.

1. How many square feet in a square yard?

2. How many cubic feet in one layer of cubes in the picture?

3. How many such layers are there?



$$4. 3 \times 9 \text{ cu. ft.} = (\quad) \text{ cu. ft.}$$

$$27 \text{ cubic feet (cu. ft.)} = 1 \text{ cubic yard (cu. yd.)}$$

WRITTEN EXERCISES

1. How many cubic feet in 2 cu. yd.? In 3 cu. yd.? In 10? In 7? In 5?

2. How many cubic yards in 54 cu. ft.? In 135 cu. ft.? In 297 cu. ft.? In 729 cu. ft.?

3. How many cubic feet in $\frac{2}{3}$ of a cu. yd.? In $\frac{5}{9}$ of a cu. yd.? In $\frac{8}{9}$ of a cu. yd.?

4. How many cubic inches in $\frac{1}{27}$ of a cu. yd.? In $\frac{1}{9}$ of a cu. yd.?

5. How many cubic yards of earth must be removed for a cellar 54 ft. long, 18 ft. wide, and 9 ft. deep?

6. How many cubic yards will a wagon box hold, filled to a level with the top, if it measures 9 ft. long, 3 ft. wide, and $1\frac{1}{2}$ ft. deep?

7. How many 3-inch cubes fill a box 2 ft. long, $1\frac{1}{2}$ ft. wide, and 1 ft. high?

8. The bottom of a box containing 180 cu. in. is a 6-in. square. What is the height of the box?

Measures of Weight

149. PREPARATORY.

1. How many bales are there in this wagon load?

2. If each bale weighs 100 lb., how many pounds of hay in this load?



$$2,000 \text{ pounds (lb.)} = 1 \text{ ton (T).}$$

ORAL EXERCISES

1. How many tons are there in 4,000 lb.? In 6,000 lb.? In 10,000 lb.? 2,500 lb.? 4,500 lb.? 5,000 lb.?

2. What part of a ton are 1000 pounds? 500 pounds?

WRITTEN EXERCISES

Find the number of tons in:

1. 52,000 lb. 2. 1,500 lb. 3. 105,000 lb. 4. 12,400 lb.

Solve:

5. Some freight cars carry 60,000 lb. How many tons is this?

6. A small coaling vessel carried 25 T. of coal to a ship in the harbor. How many pounds was this?

Find the number of pounds in:

7. $5\frac{1}{2}$ T. 8. $3\frac{1}{4}$ T. 9. $2\frac{3}{4}$ T. 10. $1\frac{5}{8}$ T. 11. $7\frac{1}{8}$ T.

REVIEW AND PRACTICE

ORAL EXERCISES

1. Select the greatest fraction among $\frac{1}{3}$, $\frac{1}{5}$, $\frac{2}{7}$, $\frac{3}{4}$, $\frac{3}{5}$.
2. Select the smallest fraction in the list above.
3. How many quarts are there in $\frac{3}{16}$ of a bu.?
4. How many hours in $\frac{3}{8}$ of a day? In $\frac{5}{8}$ of a day?
In $\frac{7}{8}$ of a day?
5. $\frac{3}{5}$ of 40 = ()? $\frac{4}{5}$ of 30 = ()? $\frac{2}{5}$ of 45 = ()?
6. Name two fractions that are greater than a unit.
Two fractions that are less than a unit.
7. What is a proper fraction? What is an improper fraction? What is a mixed number?
8. Add $\frac{1}{2}$ and $\frac{1}{4}$. $\frac{1}{3}$ and $\frac{1}{6}$. $\frac{1}{3}$ and $\frac{2}{5}$.
9. Subtract $\frac{3}{4}$ from $\frac{7}{8}$. $\frac{1}{5}$ from $\frac{7}{10}$. $\frac{2}{3}$ from $\frac{5}{6}$.
10. Express in lowest terms $\frac{4}{6}$. $\frac{8}{10}$. $\frac{9}{12}$. $\frac{12}{16}$. $\frac{8}{16}$.
 $\frac{1}{2} \frac{2}{0}$. $\frac{8}{32}$.
11. How many square inches in 1 sq. ft.?
12. How many square feet in 1 sq. yd.?
13. How many square rods in an acre?
14. How many cubic inches in a cubic foot?
15. How many cubic feet in a cubic yard?
16. How many pounds in a ton of hay?
17. How many 1-inch cubes does it take to fill a rectangular box 4 in. deep, 7 in. wide, and 10 in. high?

18. How many 1-inch cubes does it take to make a pile 6 in. long, 4 in. wide, and 5 in. high?

WRITTEN EXERCISES

1. How many square inches in $\frac{5}{8}$ of a sq. ft.?
2. How many square feet in 720 sq. in.?
3. How many cubic inches in $\frac{2}{3}$ of a cu. ft.?
4. How many cubic feet in $\frac{2}{3}$ of a cu. yd.? In 3 cu. yd.?

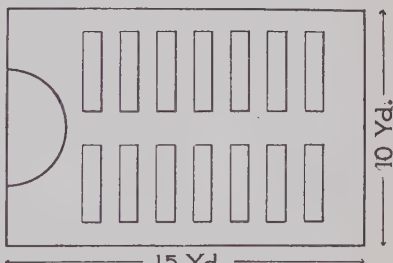
5. How many square feet in 105 sq. yd.?

6. $2\frac{3}{4}$ A. contain how many square rods?

7. Make a drawing of the schoolroom floor shown in the picture, using $\frac{1}{4}$ in. in the picture to represent 1 yd. of the floor.

The diagram on this page is drawn to the scale of $\frac{1}{8}$ in. to 1 yd.

8. How many square yards in the floor of this room?



9. If the walls were 4 yd. high, how many cubic yards of space in the room?

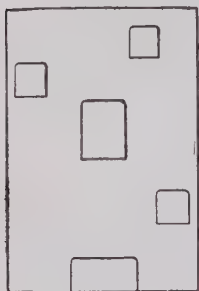
10. How many glass paper weights in the form of 3-inch cubes can be packed into a case 12 in. deep, 15 in. wide, and 24 in. long?

11. How many cubic yards of earth would be removed in digging a cellar 12 yd. long, 8 yd. wide, and 3 yd. deep?

12. Find the length, breadth, and height of your own schoolroom. Draw the floor, using a convenient scale.

13. Find the number of cubic yards in the space of your schoolroom. The number of cubic feet.

14. This is a diagram of a floor, drawn to a scale of $\frac{1}{8}$ in. to the yard. How many square yards in the actual floor?



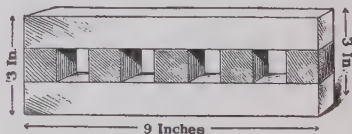
15. If you model a cube 3 in. on an edge, how many cubic inches of clay do you use?

16. If you make a column 2 in. square at the ends and 10 in. long, how many cubic inches of clay are there in it?

17. A clay tablet is 6 in. long, 8 in. wide, and $1\frac{1}{2}$ in. thick. How many cubic inches of clay does it contain?

18. The clay blocks shown in the picture are all 1 in. square at the ends. How many inches of clay were used in the model?

19. How long is a clay column whose cross-section is 1 sq. in., and whose volume is 16 cu. in.?



20. A cistern was dug 9 ft. deep, 6 ft. wide, and 12 ft. long. Express the dimensions in yards. How many cubic yards of earth were removed?

GENERAL REVIEW

ORAL EXERCISES

Read :

- | | | |
|-------------|-------------|--------------|
| 1. 100,006. | 4. 400,100. | 7. CMDVI. |
| 2. 108,905. | 5. 600,009. | 8. MCDLXIII. |
| 3. 216,900. | 6. 899,111. | 9. MMCCCIII. |

Answer :

10. In multiplication what is the result called?
11. In division what is the number divided called?
What is the result called?
12. State the multiples of 11 from 11 to 99.
13. State the multiples of 12 from 12 to 144.
14. State the multiples of 15 from 15 to 90.
15. Give an example of an improper fraction.
Another example. Another.
16. Give a proper fraction. Give another. Another.
17. Give a mixed number. Another. Another.
18. Add: $\frac{1}{2}$ and $\frac{3}{4}$; $\frac{2}{3}$ and $\frac{5}{6}$; $\frac{1}{3}$ and $\frac{3}{4}$.
19. Subtract: $\frac{1}{2}$ from $\frac{3}{4}$; $\frac{2}{3}$ from $\frac{5}{6}$; $\frac{1}{2}$ from $\frac{5}{8}$.
20. How do we show the result of multiplying by 10?
By 100? Of dividing by 100? By 10?
21. How can we compare $\frac{1}{6}$, $\frac{4}{9}$, and $\frac{1}{3}$? Which is the
largest? The smallest?
22. How do we add mixed numbers?
23. How is a fraction reduced to lower terms?

WRITTEN EXERCISES

Add:

1. 9605	2. 90635	3. 8096	4. 7428
10306	4083	4321	2917
1278	10863	5432	6412
4063	4258	6789	2001
9999	7777	11402	1989
<u>11843</u>	<u>1111</u>	<u>21850</u>	<u>20470</u>

Subtract:

5. 99860	6. 89631	7. 80063	8. 76091
<u>7896</u>	<u>5699</u>	<u>59876</u>	<u>40199</u>

Multiply:

9. 1630×12 .	13. 2605×15 .	17. 896×98 .
10. 1763×77 .	14. 4084×33 .	18. 176×85 .
11. 1284×35 .	15. 2067×27 .	19. 1984×50 .
12. 1001×75 .	16. 1206×90 .	20. 4080×63 .

Divide and find the remainders:

21. $6397 \div 33$.	25. $1172 \div 25$.	29. $1069 \div 15$.
22. $1835 \div 26$.	26. $7777 \div 91$.	30. $6666 \div 43$.
23. $8451 \div 65$.	27. $2309 \div 46$.	31. $7208 \div 57$.
24. $1305 \div 84$.	28. $9621 \div 39$.	32. $1768 \div 40$.

Divide and test:

33. $1763 \div 25$.	36. $4631 \div 86$.	39. $1670 \div 36$.
34. $2607 \div 39$.	37. $5832 \div 49$.	40. $7021 \div 70$.
35. $8460 \div 24$.	38. $9600 \div 48$.	41. $1001 \div 11$.

Add, reducing the answer to a mixed number, if possible:

42. $\frac{1}{2}\frac{5}{5}$ and $\frac{3}{5}$.

44. $1\frac{1}{2}$ and $\frac{7}{8}$.

46. $1\frac{5}{6}$ and $\frac{2}{8}$.

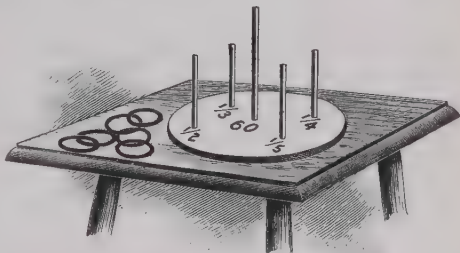
43. $\frac{7}{9}$ and $\frac{3}{4}$.

45. $\frac{3}{11}$ and $\frac{5}{6}$.

47. $\frac{3}{10}$ and $1\frac{2}{7}$.

Solve:

48. Ralph made a board similar to the one shown in the picture. The game was to throw 5 rings, one at a time, a certain distance, and to place as many as possible on the pins; the numbers of the pins on which the rings fell were added together, and the player won who had the greatest number. In 5 throws, the first ring missed, the second dropped on 1, the third on $\frac{1}{2}$, the fourth on $\frac{1}{8}$, and the fifth on $\frac{1}{2}$. What was the count?



49. Who won the following game?

Louise	$\frac{1}{2}$,	0,	$\frac{1}{8}$,	$\frac{3}{4}$,	0.
Susie	0,	1,	$\frac{1}{2}$,	$\frac{1}{2}$,	0.

50. 4 dozen pint glasses of jelly cost a baker \$26. How much was this per pint?

51. A family bought a 16-quart crate of strawberries for \$2.56. How much was this per quart?

52. It took a dozen cans at 48 cts., and 6 lb. of sugar at $5\frac{1}{2}$ cts. a lb., to can the berries. What did cans and sugar cost? Find the total cost per can.

53. If the family could have bought a dozen cans of fruit at the store for \$4, how much did they make by canning the berries for themselves?

54. A grocer bought peaches at \$15 per 100 cans, and sold them at 20 cts. a can. How much did he make on 100 cans? On 1000 cans?

55. A dealer exchanged 14 village lots worth \$250 each for a house and lot; he sold the house and lot for \$4,000. How much did he gain?

56. 4 cars loaded with wheat contain, in order, 800 bu., 980 bu., 728 bu., 696 bu. How many bushels are there in the 4 cars?

57. A horse dealer bought 400 horses for \$4,000; he sold them for \$6,000. How much did he gain on each horse?

58. How many ounces are there in 4 lb.? In 18 lb.?

59. How many pounds are there in 32 oz.? In 96 oz.? In 128 oz.? In 160 oz.? In 336 oz.?

60. Express as pounds and ounces: 372 oz.; 829 oz.; 563 oz.; 284 oz.; 358 oz.

61. How many photographs 4 in. by 5 in. can be mounted in an album of 32 pages, the space on each page being 8 in. by 10 in.?

62. If the 25 envelopes of a package, each envelope being 4 in. by 6 in., were placed the long way end to end, what would be the length of the rectangle so formed?

63. How long would the rectangle be if the envelopes were placed the narrow way, side by side? What would be its area?

64. What would be the length and breadth of the rectangle formed by arranging the envelopes 5 on a side? What would be its area?

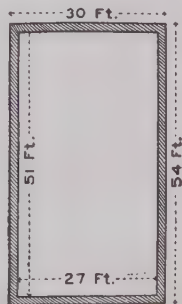
65. How many tiles 4 in. by 6 in. are needed to cover a square yard of floor space?

66. How many tiles 2 in. by 6 in. are needed to fill in the front of a mantel 2 ft. by 3 ft.?

67. A room has 3 doors, each 3 ft. wide and 8 ft. long, and 5 windows each 3 ft. wide and 9 ft. long. How many square feet of openings in the walls of the room?

68. A room has 6 windows; each window has 2 panes, each pane being 24 in. wide and 36 in. long. What is the area in square feet of the glass in one window? How many square feet of glass are there in the 6 windows?

69. How many square yards in the area of the court in the picture? How many yards in the walk shown in the shaded part?



70. What will it cost to sod a lawn 28 ft. long and 5 yd. wide, the sod costing 5 cts. for a piece 1 ft. wide and 3 ft. long, and 6 hr. of labor at 20 cts. an hour being required?

CHAPTER V

COMMON FRACTIONS

Multiplication

150. PREPARATORY.

1. What is a fraction? Name two kinds. What is a mixed number?

2. What is the name of each term of a fraction? What does each term signify?

3. Wall paper is $\frac{1}{2}$ of a yd. wide. How wide are 16 strips laid side by side?

$$16 \times \frac{1}{2} = \frac{(\quad)}{2} = (\quad)?$$

4. Some silk is $\frac{2}{3}$ of a yd. wide. How wide is a silk spread made of 5 breadths?

$$5 \times \frac{2}{3} = \frac{(\quad)}{3} = (\quad)?$$

151. *To multiply a fraction by a whole number, multiply the numerator of the fraction.*

ORAL EXERCISES

Multiply:

- | | | | |
|------------------------------|------------------------------|-------------------------------|--------------------------------|
| 1. $3 \times \frac{1}{3}$. | 6. $3 \times \frac{2}{3}$. | 11. $4 \times \frac{2}{5}$. | 16. $5 \times \frac{2}{5}$. |
| 2. $5 \times \frac{5}{6}$. | 7. $4 \times \frac{4}{5}$. | 12. $4 \times \frac{5}{6}$. | 17. $10 \times \frac{4}{5}$. |
| 3. $7 \times \frac{3}{4}$. | 8. $8 \times \frac{1}{4}$. | 13. $9 \times \frac{2}{3}$. | 18. $5 \times \frac{3}{5}$. |
| 4. $12 \times \frac{1}{4}$. | 9. $12 \times \frac{3}{4}$. | 14. $16 \times \frac{5}{8}$. | 19. $6 \times \frac{3}{2}$. |
| 5. $6 \times \frac{7}{3}$. | 10. $8 \times \frac{9}{4}$. | 15. $40 \times \frac{1}{8}$. | 20. $50 \times \frac{3}{10}$. |

Solve :

21. What is the distance around a square $\frac{3}{8}$ of an in. on each side?

22. How many pounds of rice are needed to make 12 packages of $\frac{3}{4}$ of a lb. each?

152. EXAMPLES :

1. Duck is $1\frac{1}{2}$ yd. wide. What is the width of a tent-fly made of 5 breadths of duck?

$$\begin{aligned} & 5 \times 1 \text{ yd.} + 5 \times \frac{1}{2} \text{ yd.} \\ & = 5 \text{ yd.} + 2 \text{ yd.} + \frac{1}{2} \text{ yd.} = 7\frac{1}{2} \text{ yd.} \end{aligned}$$

2. A curtain contained 7 breadths of cloth $2\frac{2}{3}$ yd. wide. How many yards wide was the curtain?

$$\begin{array}{r} 2\frac{2}{3} \\ 7 \\ \hline 7 \times \frac{2}{3} = 4\frac{2}{3} \\ 7 \times 2 = 14 \\ \hline 18\frac{2}{3} = 7 \times 2\frac{2}{3} \end{array}$$

153. *To multiply a mixed number, first multiply its fraction, then its whole number, and add the results.*

WRITTEN EXERCISES

Multiply :

1. $41\frac{1}{2}$
7

3. $211\frac{1}{3}$
5

5. $121\frac{1}{2}$
8

7. $331\frac{1}{3}$
3

9. $151\frac{1}{9}$
6

2. $181\frac{1}{5}$
6

4. $68\frac{8}{9}$
7

6. $411\frac{1}{6}$
8

8. $162\frac{2}{3}$
6

10. $245\frac{5}{8}$
9

$$\begin{array}{r} 11. \ 7\frac{9}{10} \\ \underline{5} \end{array}$$

$$\begin{array}{r} 13. \ 31\frac{7}{12} \\ \underline{12} \end{array}$$

$$\begin{array}{r} 15. \ 40\frac{5}{6} \\ \underline{9} \end{array}$$

$$\begin{array}{r} 17. \ 25\frac{3}{4} \\ \underline{6} \end{array}$$

$$\begin{array}{r} 19. \ 14\frac{3}{8} \\ \underline{10} \end{array}$$

$$\begin{array}{r} 12. \ 8\frac{2}{3} \\ \underline{6} \end{array}$$

$$\begin{array}{r} 14. \ 7\frac{3}{5} \\ \underline{10} \end{array}$$

$$\begin{array}{r} 16. \ 81\frac{7}{8} \\ \underline{16} \end{array}$$

$$\begin{array}{r} 18. \ 29\frac{1}{5} \\ \underline{40} \end{array}$$

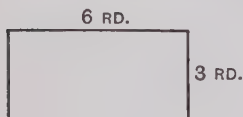
$$\begin{array}{r} 20. \ 26\frac{1}{2} \\ \underline{8} \end{array}$$

Solve:

21. A tailor used $3\frac{2}{3}$ yd. of cloth for a coat. How many yards of cloth did he need for 5 such coats?

22. What is the distance around a triangle each side of which is $7\frac{4}{5}$ yd.?

23. How many yards long is the rectangle in the picture? How many feet wide is it?



24. How many feet in 5 rd.?
In 8 rd.? In 12 rd.? In 40 rd.?
In 25 rd.?

25. How many yards in 5 rd.? In 8 rd.? In 12 rd.?
In 40 rd.? In 25 rd.?

Division

154. PREPARATORY.

1. What is $\frac{1}{2}$ of 4 dollars, or 4 dollars divided by 2?

2. What is $\frac{1}{2}$ of 4 fifths, or 4 fifths divided by 2?

3. What is $\frac{4}{5} \div 2$? $\frac{6}{7} \div 2$? $\frac{6}{7} \div 3 = ?$

In the fractions above we divided the numerator. When this cannot be done without a remainder, we multiply the denominator.

Thus, to divide $\frac{4}{5}$ by 3, multiply the denominator 5 by 3.
Then, $\frac{4}{5} \div 3 = \frac{4}{5 \times 3} = \frac{4}{15}$.

155. *To divide a fraction by a whole number, divide the numerator or multiply the denominator.*

ORAL EXERCISES

Divide:

- | | | | |
|--------------------------|--------------------------|-----------------------------|----------------------------|
| 1. $\frac{4}{6} \div 4.$ | 5. $\frac{6}{7} \div 6.$ | 9. $\frac{5}{9} \div 5.$ | 13. $\frac{8}{11} \div 2.$ |
| 2. $\frac{4}{7} \div 2.$ | 6. $\frac{8}{9} \div 4.$ | 10. $\frac{10}{11} \div 5.$ | 14. $\frac{6}{11} \div 3.$ |
| 3. $\frac{4}{5} \div 6.$ | 7. $\frac{6}{7} \div 5.$ | 11. $\frac{5}{9} \div 2.$ | 15. $\frac{8}{11} \div 3.$ |
| 4. $\frac{4}{7} \div 3.$ | 8. $\frac{8}{9} \div 3.$ | 12. $\frac{10}{11} \div 2.$ | 16. $\frac{6}{11} \div 4.$ |

Solve:

17. Mary had $\frac{8}{9}$ of a yard of ribbon and cut it into 4 equal pieces. What part of a yard was there in each piece?

18. A bicycle track $\frac{5}{8}$ of a mile long was divided into 5 equal parts. What part of a mile was there in each part?

19. A grocer sold $\frac{9}{32}$ of a bushel of berries in 3 equal lots. What part of a bushel was there in each lot?

20. A garden containing $\frac{14}{15}$ of an acre was divided into 7 equal beds. What part of an acre was there in each bed?

21. $\frac{15}{16}$ of a peck was divided into 3 equal parts. What part of a peck was there in each part?

Finding a Number When a Part Is Given

156. PREPARATORY.

1. $\frac{1}{4}$ of John's money is 10 cts., hence he has 4×10 cts.

2. $\frac{1}{5}$ of Frank's kite string measures 12 ft. How long is it?

3. $\frac{1}{3}$ of a lot contains 8 acres. How many acres in the lot?

4. $\frac{1}{6}$ of a school day is one hour. How long is a school day?

5. $\frac{1}{8}$ of a farm was sold for \$200. What was the whole farm worth at this rate?

157. EXAMPLE: $\frac{3}{4}$ of the distance from New York City to Albany is 105 mi. What is the whole distance?

$$\frac{3}{4} = 105 \text{ mi.}$$

Then $\frac{1}{4}$ of the distance = 105 mi. $\div 3$, or 35 mi.

Then, $\frac{4}{4} = 4 \times 35 \text{ mi.}$, or 140 mi.

WRITTEN EXERCISES

1. $\frac{2}{3}$ of a number is 50. What is the number?

2. Find the number $\frac{3}{4}$ of which is 90. $\frac{3}{4}$ of which is 45. 99. 360. 540.

3. Find the number $\frac{5}{8}$ of which is 35. $\frac{5}{8}$ of which is 75. 105. 200. 350. 675.

4. A grocer bought 50 bu. of apples; this was $\frac{1}{8}$ of a carload. How many bushels in the car?

5. $\frac{1}{4}$ of the water in a tank was 125 gal. How many gallons of water in the tank?

6. A tank $\frac{3}{4}$ full of oil contains 3,750 gal. How much oil can the tank hold?

7. $\frac{5}{8}$ of the distance from Detroit to Buffalo is 160 mi. What is the whole distance?

Business Fractions, or Fractional Parts of a Dollar**158. PREPARATORY.**

1. When you pay \$1.50 for an article, you pay one dollar and what part of a dollar?

$$\$1.50 = 1 \text{ dollar} + \frac{1}{2} \text{ of a dollar.}$$

2. When you buy 3 articles at \$1.50 each, you pay 3 whole dollars and how many halves?

$$3 \times \$1\frac{1}{2} = (\quad) \text{ dollars?}$$

$$3 \times \$1.50 = (\quad) \text{ dollars?}$$

3. What is the cost of 5 hats at $2\frac{1}{2}$ dollars each?

4. How many quarters in a dollar? 25 cts. is what part of a dollar?

5. When you pay \$1.25 for an article, you pay one dollar and what part of a dollar?

6. When you buy 5 articles at \$1.25 each, you pay 5 whole dollars and how many quarters?

$$5 \times \$1\frac{1}{4} = (\quad) \text{ dollars?}$$

$$5 \times \$1.25 = (\quad) \text{ dollars?}$$

7. 75 cts. is what part of a dollar? \$1.75 is one dollar and what part of a dollar?

8. 20 cts. is what part of a dollar? 40 cts.? 60 cts.?

WRITTEN EXERCISES

Multiply, using a fraction in place of the number of cents:

1. $5 \times \$1.25.$

5. $8 \times \$2.25.$

9. $5 \times \$3.10.$

2. $3 \times \$3.75.$

6. $12 \times \$1.75.$

10. $10 \times \$4.40.$

3. $6 \times \$5.50.$

7. $20 \times \$1.20.$

11. $8 \times \$5.20.$

4. $12 \times \$1.50.$

8. $15 \times \$3.20.$

12. $9 \times \$2.75.$

DECIMAL FRACTIONS

Tenths

159. We have already learned to express tenths as $\frac{1}{10}$, $\frac{3}{10}$, and so on. This is the common fraction form. There is another expression for tenths, called the decimal form.

COMMON FRACTION		DECIMAL
$\frac{1}{10}$	is written also	.1
$\frac{2}{10}$	is written also	.2
$\frac{9}{10}$	is written also	.9
$\frac{11}{10}$	is written also	1.1

1. In the first line of the table above, compare the numerator of the fraction and the figure in the decimal.

2. Compare the second number in each column. The third. The fourth.

3. In the left-hand column what shows that the fractions are tenths? In the right-hand column?

4. How many places to the right of the decimal point express tenths? What shows that the fractions are tenths?

WRITTEN EXERCISES

Write decimally :

1. $\frac{3}{10}$

4. $\frac{2}{10}$

7. $\frac{1}{10}$

10. $\frac{6}{10}$

2. $\frac{12}{10}$

5. $\frac{13}{10}$

8. $\frac{25}{10}$

11. $\frac{17}{10}$

3. $8\frac{3}{10}$

6. $5\frac{5}{10}$

9. $17\frac{1}{10}$

12. $29\frac{5}{10}$

Write as common fractions:

13. .9	15. 3.1	17. .7	19. .5
14. .7	16. 2.5	18. 1.7	20. .6

Hundredths

160. Hundredths, also, may be expressed either in decimal form or as a common fraction.

COMMON FRACTION		DECIMAL
$\frac{1}{100}$	is written also	.01
$\frac{2}{100}$	is written also	.02
$\frac{25}{100}$	is written also	.25
$\frac{90}{100}$	is written also	.90
$\frac{376}{100}$	is written also	3.76

ORAL EXERCISES

1. In the first line of the table above, how do the numerator of the fraction and the figure in the decimal form compare?

2. Answer the same question for the second line. For the third line. For the fourth. For the fifth.

3. What do the fractions in the right column have that the fractions in the left column do not have?

4. What do the fractions in the left column have that those in the right column do not have?

5. In the decimal form what serves the same purpose as the denominator in the fractional form?

6. How many places must the decimal point set off at the right to express hundredths? How many to express tenths?

WRITTEN EXERCISES

Write decimally :

1. $\frac{3}{100}$

5. $\frac{1}{100}$

9. $\frac{5}{100}$

13. $\frac{10}{100}$

2. $\frac{15}{100}$

6. $\frac{25}{100}$

10. $\frac{36}{100}$

14. $\frac{50}{100}$

3. $\frac{75}{100}$

7. $\frac{90}{100}$

11. $\frac{125}{100}$

15. $\frac{105}{100}$

4. $\frac{250}{100}$

8. $\frac{378}{100}$

12. $\frac{100}{100}$

16. $\frac{210}{100}$

Write as common fractions :

17. .02

19. .25

21. .40

23. 1.25

25. 1.00

18. .01

20. .17

22. .36

24. 1.05

26. 2.10

Equivalents

161. PREPARATORY.

1. $\frac{1}{2}$ is $\frac{(\quad)}{100}$? $\frac{1}{5} = \frac{(\quad)}{100}$? $\frac{1}{4} = \frac{(\quad)}{100}$?

2. Write each of the above fractions decimally.

3. The following are important equivalents, and they should be memorized :

TABLE

$\frac{1}{2} = .50$, or .5	$\frac{1}{4} = .25$
$\frac{1}{5} = .20$, or .2	$\frac{3}{4} = .75$

ORAL EXERCISES

1. To multiply a number by .5 is to find what part of the number?

2. To multiply a number by .25 is to find what part?

3. To multiply a number by .75 is to find what part?

4. To find .20 of a number is to find what part?
5. To find .40 of a number is to find what part?

WRITTEN EXERCISES

1. Draw a square and divide it into equal parts so as to show .50 of it. .25 of it. .20 of it. .75 of it.

2. Express $\frac{4}{5}$ decimally as hundredths. Express $\frac{3}{4}$ as hundredths. Also $\frac{3}{5}$. $\frac{2}{5}$.

3. Write the common fraction equal to .25. To .75. To .50. To .40. To .80.

4. Express $\frac{3}{5}$ decimally as hundredths. Express decimally: $\frac{2}{5}$; $\frac{4}{5}$; $\frac{6}{5}$; $\frac{3}{4}$; $\frac{1}{4}$; $\frac{4}{5}$; $\frac{3}{5}$.

Find the product by using the common fraction instead of the decimal:

- | | | |
|----------------------|-----------------------|------------------------|
| 5. $25 \times .20$. | 9. $.25 \times 24$. | 13. $.75 \times 48$. |
| 6. $.80 \times 45$. | 10. $28 \times .75$. | 14. $.40 \times 35$. |
| 7. $.75 \times 20$. | 11. $.50 \times 60$. | 15. $95 \times .20$. |
| 8. $70 \times .80$. | 12. $.5 \times 100$. | 16. $.25 \times 128$. |

162. EXAMPLE: When butter costs 25 cts. a lb., what is the cost of 16 lb.?

$25\text{¢} = .25 \text{ dollars} = \$\frac{1}{4}$, the cost of 1 lb.

$16 \times \$\frac{1}{4} = \$\frac{16}{4} = \$4$, the cost of 16 lb.

WRITTEN EXERCISES

1. What is the cost of 40 yd. of cloth at 75 cts. a yd.?
2. What is the cost of 6 lb. of tea at 50 cts. a lb.?
3. What is the cost of 12 lb. of coffee at 40 cts. a lb.?

4. What is the cost of 30 yd. of cloth at 80 cts. a yd. ?
 5. When sugar is 5 cts. a lb., what is the cost of 48 lb. ?

Processes with Decimals

163. Numbers expressing dollars and cents are added, subtracted, multiplied, and divided as follows :

1	2	3	4
ADDING	SUBTRACTING	MULTIPLYING	DIVIDING
\$3.25	\$3.25	\$1.25	
1.76	1.48	3	\$.53
<hr/> \$5.01	<hr/> \$1.77	<hr/> \$3.75	9) <hr/> \$4.77

Read each of the examples above, using "units and hundredths" for dollars and cents.

164. The processes are the same with units and decimals as with dollars and cents :

Thus, the examples above mean :

1	2	3	4
3.25	3.25	1.25	
1.76	1.48	3	.53
<hr/> 5.01	<hr/> 1.77	<hr/> 3.75	9) <hr/> 4.77

165. *In decimals perform the processes as in whole numbers and place the decimal point as in processes with dollars and cents.*

WRITTEN EXERCISES

Add :

1. 4.85	2. 9.64	3. 4.62	4. 7.33	5. 12.05	6. 20.16
6.90	3.27	10.19	8.96	9.76	17.35
<hr/> 3.76	<hr/> 1.05	<hr/> 7.26	<hr/> 12.08	<hr/> 15.03	<hr/> 99.88

Subtract:

7. $\begin{array}{r} 7.76 \\ \underline{2.39} \end{array}$	9. $\begin{array}{r} 5.44 \\ \underline{3.67} \end{array}$	11. $\begin{array}{r} 128.9 \\ \underline{99.5} \end{array}$	13. $\begin{array}{r} 56.84 \\ \underline{7.77} \end{array}$	15. $\begin{array}{r} 980.05 \\ \underline{279.91} \end{array}$
--	--	--	--	---

8. $\begin{array}{r} 12.09 \\ \underline{6.68} \end{array}$	10. $\begin{array}{r} 33.44 \\ \underline{9.84} \end{array}$	12. $\begin{array}{r} 10.08 \\ \underline{5.67} \end{array}$	14. $\begin{array}{r} 90.17 \\ \underline{10.88} \end{array}$	16. $\begin{array}{r} 605.50 \\ \underline{432.50} \end{array}$
---	--	--	---	---

Multiply:

17. $\begin{array}{r} .20 \\ \underline{28} \end{array}$	19. $\begin{array}{r} .80 \\ \underline{45} \end{array}$	21. $\begin{array}{r} .75 \\ \underline{20} \end{array}$	23. $\begin{array}{r} .80 \\ \underline{70} \end{array}$	25. $\begin{array}{r} .05 \\ \underline{38} \end{array}$
--	--	--	--	--

18. $\begin{array}{r} .50 \\ \underline{60} \end{array}$	20. $\begin{array}{r} .5 \\ \underline{100} \end{array}$	22. $\begin{array}{r} .20 \\ \underline{28} \end{array}$	24. $\begin{array}{r} .20 \\ \underline{18} \end{array}$	26. $\begin{array}{r} .18 \\ \underline{67} \end{array}$
--	--	--	--	--

Divide:

27. $8.48 \div 12.$	29. $6.25 \div 25.$	31. $1.05 \div 35.$
---------------------	---------------------	---------------------

28. $6.25 \div 125.$	30. $7.05 \div 15.$	32. $14.4 \div 16.$
----------------------	---------------------	---------------------

Solve:

33. One block is 8.75 rd. long, and the adjacent block is 7.65 rd. long. How long are the two together?

34. A rectangular field contained 40.98 A., from which 19.39 A. were sold. How many acres remained?

35. A square court was 25.15 yd. on a side. What was the length of the walk surrounding it?

36. A distance of 85.75 ft. was marked off into 5 equal lengths. How many feet in each part?

37. A rectangular field was 17.2 yd. wide and 28.4 yd. long. How many yards was it around the field?

38. A set of 15 steps are 123.75 in. high. How high is each step?

REVIEW AND PRACTICE

WRITTEN EXERCISES

Add:

- | | | |
|---|---|---|
| 1. $\frac{1}{2} + \frac{1}{4}$. | 5. $\frac{1}{2} + \frac{3}{4}$. | 9. $\frac{3}{4} + \frac{1}{8}$. |
| 2. $\frac{1}{7} + \frac{1}{14}$. | 6. $\frac{3}{7} + \frac{1}{14}$. | 10. $\frac{3}{8} + \frac{1}{4}$. |
| 3. $\frac{3}{8} + \frac{1}{16}$. | 7. $\frac{5}{16} + \frac{1}{4}$. | 11. $\frac{3}{4} + \frac{3}{8}$. |
| 4. $\frac{5}{8} + \frac{1}{32}$. | 8. $\frac{3}{16} + \frac{1}{32}$. | 12. $\frac{1}{12} + \frac{5}{24}$. |
| 13. $\begin{array}{r} 1811.75 \\ 1274.85 \\ \hline \end{array}$ | 15. $\begin{array}{r} 2013.91 \\ 419.64 \\ \hline \end{array}$ | 17. $\begin{array}{r} 6414.91 \\ 1710.19 \\ \hline \end{array}$ |
| 14. $\begin{array}{r} 4128.32 \\ 799.64 \\ \hline \end{array}$ | 16. $\begin{array}{r} 7836.84 \\ 3012.05 \\ \hline \end{array}$ | 18. $\begin{array}{r} 8137.39 \\ 299.88 \\ \hline \end{array}$ |

Subtract:

- | | | | |
|--|--|---|---|
| 19. $\frac{5}{8} - \frac{1}{32}$. | 23. $\frac{3}{16} - \frac{1}{32}$. | 27. $\frac{5}{24} - \frac{1}{12}$. | |
| 20. $\frac{1}{7} - \frac{1}{14}$. | 24. $\frac{3}{8} - \frac{1}{18}$. | 28. $\frac{3}{4} - \frac{3}{8}$. | |
| 21. $\frac{5}{16} - \frac{1}{4}$. | 25. $\frac{3}{7} - \frac{1}{14}$. | 29. $\frac{3}{4} - \frac{1}{2}$. | |
| 22. $1\frac{2}{7} - \frac{3}{14}$. | 26. $5\frac{5}{6} - 2\frac{5}{12}$. | 30. $12\frac{1}{3} - 8\frac{1}{2}$. | |
| 31. $\begin{array}{r} 1436.25 \\ 763.99 \\ \hline \end{array}$ | 33. $\begin{array}{r} 936.84 \\ 615.03 \\ \hline \end{array}$ | 35. $\begin{array}{r} 437.39 \\ 217.35 \\ \hline \end{array}$ | 37. $\begin{array}{r} 389.07 \\ 190.70 \\ \hline \end{array}$ |
| 32. $\begin{array}{r} 1063.47 \\ 909.09 \\ \hline \end{array}$ | 34. $\begin{array}{r} 2807.13 \\ 600.06 \\ \hline \end{array}$ | 36. $\begin{array}{r} 4036.03 \\ 1507.08 \\ \hline \end{array}$ | 38. $\begin{array}{r} 1652.8 \\ 773.2 \\ \hline \end{array}$ |

Reduce to lowest terms:

- | | | | | | | |
|-----------------------|-----------------------|-----------------------|---------------------|-----------------------|-----------------------|-----------------------|
| 39. $\frac{7}{14}$. | 41. $\frac{4}{6}$. | 43. $\frac{8}{20}$. | 45. $\frac{6}{8}$. | 47. $\frac{12}{20}$. | 49. $\frac{10}{16}$. | 51. $\frac{12}{16}$. |
| 40. $\frac{16}{32}$. | 42. $\frac{14}{16}$. | 44. $\frac{12}{24}$. | 46. $\frac{6}{9}$. | 48. $\frac{16}{24}$. | 50. $\frac{5}{10}$. | 52. $\frac{15}{25}$. |

Multiply :

53. $6 \times \frac{4}{5}$.

57. $7 \times 1\frac{3}{7}$.

61. $7 \times \frac{5}{8}$.

54. $4 \times 2\frac{5}{6}$.

58. $8 \times 6\frac{3}{4}$.

62. $16 \times \frac{3}{8}$.

55. $32 \times \frac{5}{8}$.

59. $45 \times \frac{7}{15}$.

63. $64 \times 1\frac{5}{16}$.

56. $35 \times 6\frac{3}{5}$.

60. $24 \times 5\frac{5}{8}$.

64. $27 \times \frac{4}{9}$.

$$\begin{array}{r} 65. \quad 4.85 \\ \quad \quad 5 \\ \hline \end{array}$$

$$\begin{array}{r} 67. \quad 16.27 \\ \quad \quad 8 \\ \hline \end{array}$$

$$\begin{array}{r} 69. \quad 14.62 \\ \quad \quad 7 \\ \hline \end{array}$$

$$\begin{array}{r} 71. \quad 18.15 \\ \quad \quad 9 \\ \hline \end{array}$$

$$\begin{array}{r} 66. \quad 14.03 \\ \quad \quad 17 \\ \hline \end{array}$$

$$\begin{array}{r} 68. \quad 30.99 \\ \quad \quad 86 \\ \hline \end{array}$$

$$\begin{array}{r} 70. \quad 93.85 \\ \quad \quad 77 \\ \hline \end{array}$$

$$\begin{array}{r} 72. \quad 87.28 \\ \quad \quad 42 \\ \hline \end{array}$$

Multiply, using a fraction in place of the number of cents :

73. $20 \times \$2.25$.

75. $25 \times \$6.20$.

77. $16 \times \$5.50$.

74. $8 \times \$4.75$.

76. $15 \times \$9.40$.

78. $20 \times \$6.80$.

Write as a common fraction :

79. .7.

81. 4.9.

83. 1.05.

85. .21.

80. 3.7.

82. .6.

84. .08.

86. 6.40.

Divide :

87. $9 \overline{)1.44}$

90. $6 \overline{)426.6}$

93. $16 \overline{)25.6}$

96. $12 \overline{)17.28}$

88. $7 \overline{)2.45}$

91. $8 \overline{)28.08}$

94. $15 \overline{)91.5}$

97. $25 \overline{)6.25}$

89. $15 \overline{)305.75}$

92. $33 \overline{)63.63}$

95. $13 \overline{)395.2}$

98. $17 \overline{)391.17}$

Solve :

99. Lucy used $\frac{3}{4}$ of a yd. of cloth for an apron and $\frac{1}{3}$ of a yd. for trimming. How much did she use in all?

100. $\frac{7}{8}$ of a yd. of ribbon is used to wrap a Christmas box, including $\frac{1}{4}$ of a yd. for tying the knot. How far is it around the box?

101. A tablet is $\frac{5}{6}$ ft. long and $\frac{1}{3}$ ft. wide. What is the distance around it in feet? In inches?

102. A pen is $\frac{7}{12}$ ft. long and a pencil $\frac{1}{3}$ ft. Which is the longer? By how many inches?

103. A square field is $12\frac{3}{4}$ rd. on a side. What is the distance around it?

104. How many feet in 9 rd.? In 12 rd.? In 45 rd.?

105. How many yards in 7 rd.? In 16 rd.? In 12 rd.? 30 rd.?

106. How many square feet are there in the area of a triangle of base $\frac{6}{7}$ of a ft. and altitude $\frac{1}{6}$ of a ft.?

107. $\frac{2}{5}$ of a number is 638. What is the number?

108. $\frac{5}{8}$ of a number is 845. What is the number?

109. $\frac{3}{7}$ of a man's annual salary was \$930. How much did he earn per year?

110. Write four fractions commonly used to express parts of a dollar and write the number of cents in each.

111. If a desk costs \$3.75, what will 5 desks cost? If each desk weighs 50 lb., how many hundred pounds in the weight of the desks? If the freight rate is \$.50 per 100 lb., what is the cost of shipment?

112. If it costs \$6.40 to lay 25 ft. of gas-pipe, what will it cost to lay 500 ft. at the same rate?

BILLS

166. The following is a bill.

MARSHALL FIELD & COMPANY.

IMPORTERS, RETAILERS, MANUFACTURERS,

STATE, WASHINGTON, RANDOLPH & WABASH

CHICAGO, Aug. 1, 1909

SOLD TO

MR JOHN DOE

1017 STATE ST

4/4913

NOTICE—MERCHANDISE TO BE CREDITED ON CURRENT BILL MUST BE RETURNED BEFORE THE LAST DAY OF THE MONTH.

JULY								
6	5	YD. SILK	95	4	75			
	4	SPOOLS THREAD	04		16	4	91	
13	2	PR RUBBERS	55	1	10			
	6	CAKES SOAP	08		48	1	58	
24	1	UMBRELLA				1	48	
						7	97	

RECEIVED PAYMENT
 7 AUG 6 1909. 7
 MARSHALL FIELD & CO.

1. In the bill above, what is the date of purchase? Place? Who is the buyer? The seller?
2. Give the quantity, price, and cost of the first article. The second. The third.
3. What is the total amount of the bill? When was it paid?

4. Why should a bill be dated? Why should it be receipted when paid? Why is it desirable to keep receipted bills?

WRITTEN EXERCISES

Procure or rule bill forms. Make out bills for the following, using your own name for buyer, and as seller some firm that deals in the goods to be billed. Fill out properly, find the amount, and receipt the bill:

- | | |
|-------------------------------------|--|
| 1. 9 yd. lace, \$.35. | 7. 3 bbl. flour, \$4.25. |
| 6 yd. cotton, \$.16. | 5 bu. potatoes, \$.65. |
| 3 spools thread, \$.05. | 40 heads cabbage, $6\frac{1}{2}\phi$. |
| 2. 7 lb. rice, $9\frac{1}{2}\phi$. | 8. 6 pans, \$.25. |
| 5 lb. sugar, $6\frac{1}{2}\phi$. | 3 pails, \$.50. |
| 10 lb. coffee, \$.45. | 18 lb. nails, 3ϕ . |
| 3. 1 pr. rubbers, 90ϕ . | 9. 16 bu. oats, \$.45. |
| 2 pr. shoes, \$4.50. | 5 T. straw, \$3. |
| 1 pr. slippers, \$2.50. | 10 T. hay, \$11.50. |
| 4. 5 yd. lace, \$.15. | 10. 4 bits, \$.15. |
| $2\frac{1}{2}$ yd. silk, \$1. | 1 saw, \$1.25. |
| 8 yd. cloth, \$.75. | 3 planes, \$.65. |
| 3 pieces braid, \$.06. | 1 hammer, \$.35. |
| 5. 15 bu. oats, \$.35. | 11. 5 lb. lard, \$.08. |
| 3 bales hay, \$1.50. | $6\frac{1}{2}$ lb. beef, \$.12. |
| 2 bales straw, \$.45. | 4 lb. sausage, \$.10. |
| 400 lb. of meal, \$1.25. | 12 lb. butter, \$.18. |
| 6. 2 lb. tea, \$.55. | 12. $1\frac{1}{2}$ lb. candy, \$.40. |
| $3\frac{1}{2}$ bu. potatoes, \$.60. | 2 qt. peanuts, \$.15. |
| 6 cans tomatoes, \$.12. | $1\frac{1}{2}$ gal. ice-cream, \$.80. |

Make the bills and find the amount of each :

13. Charles Ward bought of Richard White 225 ft. tile at \$.04; 10 bbl. lime at \$3.25; 3 T. soft coal at \$4.

14. Anna Spencer bought of Charles Martin and Co. 5 yd. silk at \$1.75; $\frac{1}{4}$ yd. lace at \$5; 6 spools silk at 10 cts.

15. Mary Matthews bought of H. C. Taylor and Co. 6 books at \$1.75, 4 tablets at 15 cts., 20 pencils at $2\frac{1}{2}$ cts., and 3 packages of writing-paper at 25 cts. a package.

16. Stephen Miles sold to Thomas Stearns 40 bu. of rye at \$.75 a bu., 10 bu. of oats at 50 cts. a bu., and 100 bu. of wheat at 65 cts. a bu.

17. Edward Riley bought of a publisher 7 Latin Grammars at \$1.65 each, 3 Arithmetics at \$.95 each, and 9 Geographies at \$.75 each.

18. Mrs. George Sampson bought of Marshall Field and Co., 10 yd. of dimity at 25 cts. a yd., 3 yd. of silk at 75 cts. a yd., 6 pairs of curtains at \$7.50 a pair, and 20 yd. of matting at 45 cts. a yd.

19. Mrs. T. C. Jones bought of William Miller 5 lb. of butter at 25 cts. a lb., 6 cans of corn at 10 cts. a can, 20 lb. of sugar at 6 cts. a lb.

20. Evans and Treat sold to Henry Field 6 rolls of kodak films at 70 cts. a roll, 1 printing frame at \$2, and 1 doz. packages trimmed paper at 20 cts. a package.

STARR'S GENERAL MARKET

GROCERY DEPARTMENT

Sugar (with order) 5 lb. for	-	-	-	-	-	23c.
Flour, the very best, per sack	-	-	-	-	-	62c.
Potatoes, fancy Burbanks, per pk., 21c.					Per bushel	80c.
Navy Beans, per qt.	-	-	-	-	-	8c.
Shredded Wheat, per packet	-	-	-	-	-	10c.
Grape Nuts, per packet	-	-	-	-	-	10c.
Washing Soda, per lb.	-	-	-	-	-	1c.
APPLES: Northern Spies	-	-	-	-		
“ Russets	-	-	-	-		
“ Baldwins	-	-	-	-		
“ 20 oz. Pippins	-	-	-	-		
“ Sweets	-	-	-	-		
“ Kings	-	-	-	-		
						per pk. 39c.

MEAT MARKET

Native Roast Beef, per lb.	-	-	-	-	-	16c.
Leg Mutton, per lb.	-	-	-	-	-	15c.
Loin Mutton Chops, per lb.	-	-	-	-	-	18c.
Hind Quarter Spring Lamb, per lb.	-	-	-	-	-	14c.
Fore Quarter Spring Lamb, per lb.	-	-	-	-	-	12c.
Lamb Chops, rib or loin, per lb.	-	-	-	-	-	20c.
Swift's Branded Hams, per lb.	-	-	-	-	-	15c.
3-lb. pail Leaf Rendered Lard	-	-	-	-	-	48c.

From the price-list above find the total cost of each order in Exercises 21-24:

21. Flour, 1 sack.
 Navy beans, 4 qt.
 Shredded Wheat, 2
 packages.
 Lamb chops, 3 lb.
 Leaf lard, 3-lb. pail.

- Sugar, 5 lb.
 Potatoes, $\frac{1}{2}$ bu.
 Washing soda, 4 lb.
 Apples, 2 pk.
 Grape Nuts, 3 pack-
 ages.

- | | |
|-------------------------|----------------------------|
| 22. Flour, 2 sacks. | Sugar, 10 lb. |
| Grape Nuts, 6 packages. | Navy beans, 2 qt. |
| Northern Spies, 3 pk. | Shredded Wheat, 1 package. |

- | | |
|---------------------------------------|-------------------|
| 23. Leg mutton, 5 lb. | Leaf lard, 3 lb. |
| Native roast beef, $2\frac{1}{2}$ lb. | Lamb chops, 2 lb. |

- | | |
|-----------------------------------|--------------------------------|
| 24. Sugar, 10 lb. | Leaf lard, 6 lb. |
| Potatoes, $\frac{3}{4}$ bu. | Roast beef, $3\frac{1}{2}$ lb. |
| Grape Nuts, 2 packages. | Swift's ham, 10 lb. |
| Baldwin Apples, $\frac{1}{2}$ bu. | Leg mutton, $3\frac{1}{2}$ lb. |

25. Mary buys at the store 2 bunches of radishes at 4 cts. a bunch, 1 pt. of pickles at 20 cts. a qt., and 3 bars of soap at 5 cts. a bar. How much change does she receive out of 4 dimes?

Make and solve 2 problems from each price-list below, using different amounts of each article :

- | | |
|-------------------------|--------------------------|
| 26. Lace, 6¢ a yd. | 29. Insoles, 12¢ a pair. |
| Muslin, 20¢ a yd. | Blacking, 15¢ a box. |
| Buttons, 15¢ a doz. | Shoe-laces, 5¢ a pair. |
| 27. Berries, 7¢ per qt. | 30. Lard, 12¢ per lb. |
| Cookies, 9¢ " lb. | Sirup, 50¢ " gal. |
| Bread, 5¢ " loaf. | Eggs, 18¢ " doz. |
| Lettuce, 3¢ " head. | Oranges, 30¢ per doz. |
| 28. Twist, 3¢ a spool. | 31. Ink, 5¢ a bottle. |
| Thread, 5¢ a spool. | Pencils, 5¢ each. |
| Tape, 5¢ for 2 rolls. | Tablets, 8¢ each. |
| Pins, 8¢ a paper. | Blank books, 3¢ each. |

32. Rice, 8¢ per lb.
 Peas, 15¢ per can.
 Corn, 10¢ " "
 Tomatoes, 12¢ per can.
33. Calico, 5¢ a yd.
 Silesia, 15¢ a yd.
 Cambric, 8¢ a yd.
 Canvas, 10¢ a yd.
34. Sugar, 6¢ per lb.
 Coffee, 30¢ per lb.
 Butter, 20¢ " "
 Asparagus, 20¢ per can.
35. Soda, 8¢ a lb.
 Witch-hazel, 5¢ an oz.
 Ammonia, 20¢ a pt.
 Camphor, 5¢ an oz.

P.88 BEADLE & SHERBOURNE CO.			
<i>Mrs Wilson</i>			
Sales No.	Dept	Date	Am't Recd
<i>84</i>	<i>70</i>	<i>6/8</i>	<i>10.75</i>
<i>2 1/2 White Silk</i>			<i>1.50</i>
<i>3 Black Silk</i>			<i>3.75</i>
<i>1 1/2 Velvet</i>			<i>3.00</i>
<i>2 1/4 Satin</i>			<i>2.50</i>

PAID
B&S.CO.

167. This is a sales check or memorandum of a customer's purchases. The numbers at the left show the number of yards purchased; the amounts at the right indicate the cost of each article.

1. What is the price of each article per yard?
2. What is the amount of the check?

WRITTEN EXERCISES

1. A customer has 4 sales checks of the following amounts: \$2.50, \$1.75, \$.85, \$3.05. What is the total amount of the purchases?

2. Find the total of the following sales checks: \$3.65, \$2.18, \$1.05, \$.63, \$.38, \$3.17, \$1.

3. Make out a sales check, giving the name of the firm, of the customer, and of the department, the date of sale, and the articles sold with their values, and find the amount of the check.

4. The items of a sales check are: 4 silk, \$4; $\frac{1}{2}$ lace, \$1.50; $\frac{3}{4}$ velvet, \$1.50. What is the price of each article per yard? What is the amount of the check?

5. The items of a sales check are:

Matches,	25¢	Gelatine,	15¢	Olives,	50¢
Eggs,	30¢	Bananas,	13¢	Olive-oil,	50¢
Celery,	10¢	Wafers,	15¢	Potatoes,	40¢
Pineapple,	20¢	Coffee,	35¢	Lard,	12¢

What is the amount of the check?

6. Write out a sales check for Mr. Roe who bought of Star and Frost the following articles:

6 neckties at 50 cts. each	12 hats at 75 cts. each
24 pairs of cuffs at 15 cts. a pair	9 shirts at \$1 each
15 handkerchiefs at 25 cts. each	18 collars at 12 cts. each
16 pairs of socks at 40 cts. each	7 neckscarfs at \$1.50 each

Find the total of this bill.

DENOMINATE NUMBERS

Addition

168. EXAMPLE: A three-cornered lot has sides 112 yd. 2 ft. 4 in., 109 yd. 2 in., and 127 yd. 1 ft. 11 in. long. What is the length of the fence around it?

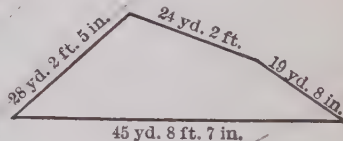
$$\begin{array}{r}
 112 \text{ yd. } 2 \text{ ft. } 4 \text{ in.} \\
 109 2 \\
 127 1 11 \\
 \hline
 349 \text{ yd. } 1 \text{ ft. } 5 \text{ in.}
 \end{array}$$

The sum of a column may need reduction. Thus, in the first, 11 in. + 2 in. + 4 in. = 17 in. = 1 ft. 5 in.

The length of the fence is 349 yd. 1 ft. 5 in.

WRITTEN EXERCISES

1. Find the length of the fence around the lot in the picture:



Add:

$$\begin{array}{r}
 2. \ 9 \text{ ft. } 7 \text{ in.} \\
 3 6 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 3. \ 6.25 \text{ mi. } 8 \text{ ft.} \\
 10.75 5 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 4. \ 15 \text{ ft. } 3 \text{ in.} \\
 17 11 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 5. \ 9 \text{ yd. } 2 \text{ ft. } 3 \text{ in.} \\
 20 0 9 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 6. \ 3 \text{ gal. } 3 \text{ qt. } 1 \text{ pt.} \\
 5 2 0 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 7. \ 25 \text{ lb. } 3 \text{ oz.} \\
 9 14 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 8. \ 28 \text{ gal. } 2 \text{ qt.} \\
 46 2 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 9. \ 40 \text{ sq. ft. } 72 \text{ sq. in.} \\
 80 72 \\
 \hline
 \end{array}$$

Subtraction

169. EXAMPLE: A ditch 75 yd. long is to be dug; the first day the workmen dig 30 yd. 2 ft. 6 in. What length remains to be dug?

$$\begin{array}{r}
 74 \quad 2 \quad 12 \\
 \cancel{75} \text{ yd. } \cancel{0} \text{ ft. } \cancel{0} \text{ in.} \\
 30 \quad 2 \quad 6 \\
 \hline
 44 \text{ yd. } 0 \text{ ft. } 6 \text{ in.}
 \end{array}$$

When the minuend in any column is too small, we supply from the next column to the left. In this example we take 1 yd. from 75 yd. 1 yd. = 3 ft. We still need to fill the blank in the inches column. Taking 1 ft. from the 3 ft., we have 12 in. We then subtract 2 ft. 6 in. from the 2 ft. 12 in.

WRITTEN EXERCISES

Subtract:

1. 13 ft. 0 in.

$$\begin{array}{r}
 3 \quad 5 \\
 \hline
 \end{array}$$

5. 200 lb. 12 oz.

$$\begin{array}{r}
 105 \quad 15 \\
 \hline
 \end{array}$$

2. 14 ft. 5 in.

$$\begin{array}{r}
 5 \quad 10.75 \\
 \hline
 \end{array}$$

6. 35 lb. 1 oz.

$$\begin{array}{r}
 9 \quad 14 \\
 \hline
 \end{array}$$

3. 86 yd. 0 ft. 0 in.

$$\begin{array}{r}
 50 \quad 6 \quad 3 \\
 \hline
 \end{array}$$

7. 100 sq. ft. 64 sq. in.

$$\begin{array}{r}
 90 \quad 80 \\
 \hline
 \end{array}$$

4. 100 gal. 2 qt. 1 pt.

$$\begin{array}{r}
 75 \quad 3 \quad 1 \\
 \hline
 \end{array}$$

8. 9 gal. 2 qt. 0 pt.

$$\begin{array}{r}
 5 \quad 2 \quad 1 \\
 \hline
 \end{array}$$

Solve:

9. A boy walked 260 yd. 1 ft. 8 in. north, then 179 yd. 2 ft. 10 in. south. How far did he walk in all? How far was he from his starting point?

10. Henry painted 24 yd. 2 ft. 6 in. of a 100-yard fence; and James, 19 yd. 1 ft. 8 in. How much remained to be done?

Multiplication

170. PREPARATORY.

5 sacks of salt weighed 12 lb. 5 oz. each. What did the 5 sacks weigh?

$$\begin{array}{r}
 12 \text{ lb. } 5 \text{ oz.} \\
 \quad \quad 5 \\
 \hline
 60 \text{ lb. } 25 \text{ oz.} \qquad (25 \text{ oz.} = 1 \text{ lb. } 9 \text{ oz.}) \\
 \text{or } 61 \text{ lb. } 9 \text{ oz.}
 \end{array}$$

WRITTEN EXERCISES

Multiply:

$$\begin{array}{r}
 1. \ 5 \text{ lb. } 14 \text{ oz.} \\
 \quad \quad 6 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 3. \ 3 \text{ yd. } 2 \text{ ft. } 10 \text{ in.} \\
 \quad \quad \quad 8 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 2. \ 13 \text{ lb. } 5 \text{ oz.} \\
 \quad \quad 8 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 4. \ 1 \text{ da. } 3 \text{ hr. } 40 \text{ min.} \\
 \quad \quad \quad 10 \\
 \hline
 \end{array}$$

Solve:

5. What is the weight of 5 sacks of sugar, each weighing 8 lb. 12 oz.?

6. What is the perimeter of a square 5 yd. 2 ft. 8 in. on a side?

7. What is the weight of 6 sacks of flour each weighing 48 lb. 12 oz.?

8. What is the amount of milk contained in 12 cans each holding 8 gal. 1 qt. 1 pt.?

GENERAL REVIEW OF BOOK

I

1. Read: 600,505; 999,800; 507,325; 1,763,409.
2. Write in figures: Eight hundred thousand, five.
3. Write in figures: Three hundred twenty-eight thousand, four hundred five.
4. Give the number for which each of these characters stands: I; V; X; L; C; D; M.
5. What do we call this notation? Why?
6. Write in letters: 499; 904; 126; 1909; 600.
7. What do we call our common notation? Why?

Add:

8. 802	10. 978	12. 487	14. 925	16. 689
655	845	867	494	545
310	712	915	375	492
<u>437</u>	<u>676</u>	<u>645</u>	<u>266</u>	<u>312</u>
9. 218	11. 815	13. 570	15. 670	17. 770
373	786	888	942	749
991	357	749	473	829
<u>868</u>	<u>552</u>	<u>277</u>	<u>325</u>	<u>958</u>
18. \$98.70	19. \$67.58	20. \$79.52	21. \$42.33	
77.77	23.53	67.98	20.00	
23.46	40.80	38.55	11.00	
<u>81.50</u>	<u>35.99</u>	<u>77.74</u>	<u>43.27</u>	

22. \$66.70	24. \$76.90	26. \$88.95	28. \$96.46
42.55	88.96	33.48	32.25
<u>88.56</u>	<u>22.68</u>	<u>11.47</u>	<u>27.98</u>
23. 180.9	25. 146.5	27. 440.07	29. 140.85
263.5	800.6	699.70	96.72
<u>799.7</u>	<u>327.4</u>	<u>750.00</u>	<u>208.66</u>

Subtract :

30. 1644	32. 3897	34. 6420	36. 9525	38. 1056
<u>599</u>	<u>1543</u>	<u>5279</u>	<u>8398</u>	<u>382</u>
31. 7965	33. 6328	35. 3654	37. 6159	39. 9000
<u>1547</u>	<u>4322</u>	<u>2648</u>	<u>84</u>	<u>2222</u>
40. \$975.40	43. \$888.90	46. \$364.40	49. \$184.95	
<u>630.16</u>	<u>364.52</u>	<u>125.50</u>	<u>67.97</u>	
41. \$441.38	44. \$333.33	47. \$700.85	50. \$866.29	
<u>221.70</u>	<u>266.66</u>	<u>400.90</u>	<u>390.07</u>	
42. 1000.5	45. 6225.0	48. 480.50	51. 903.47	
<u>300.9</u>	<u>1875.5</u>	<u>200.05</u>	<u>126.99</u>	

Multiply :

52. $50 \times 99.$	56. $34 \times 57.$	60. $17 \times \$84.$	
53. $48 \times 76.$	57. $42 \times 99.$	61. $25 \times \$100.$	
54. $80 \times 90.$	58. $30 \times 89.$	62. $10 \times \$150.$	
55. $78 \times 34.$	59. $92 \times 99.$	63. $100 \times \$70. ,$	
64. \$863.56	65. \$44.40	66. \$1,010.10	67. \$32.98
40	55	29	67

68. $\begin{array}{r} 676.3 \\ \underline{15} \end{array}$	70. $\begin{array}{r} 176.8 \\ \underline{49} \end{array}$	72. $\begin{array}{r} 760.05 \\ \underline{63} \end{array}$	74. $\begin{array}{r} 45.7 \\ \underline{100} \end{array}$
69. $\begin{array}{r} 212.05 \\ \underline{9} \end{array}$	71. $\begin{array}{r} 127.35 \\ \underline{12} \end{array}$	73. $\begin{array}{r} 199.88 \\ \underline{15} \end{array}$	75. $\begin{array}{r} 214.21 \\ \underline{72} \end{array}$

Divide:

76. $8,000 \div 6.$	80. $6,899 \div 3.$	84. $6,020 \div 10.$	
77. $5,060 \div 53.$	81. $8,965 \div 35.$	85. $3,400 \div 17.$	
78. $7,965 \div 15.$	82. $5,400 \div 25.$	86. $9,200 \div 100.$	
79. $7,653 \div 29.$	83. $9,854 \div 42.$	87. $5,175 \div 50.$	
88. $38 \overline{)418}$	92. $25 \overline{)3200}$	96. $12 \overline{)2905}$	100. $11 \overline{)8889}$
89. $57 \overline{)1938}$	93. $49 \overline{)3430}$	97. $15 \overline{)6305}$	101. $20 \overline{)5000}$
90. $65 \overline{)\$780}$	94. $4 \overline{)\$18.20}$	98. $7 \overline{)\$2.03}$	102. $11 \overline{)\$1.43}$
91. $29 \overline{)4.93}$	95. $37 \overline{)227.6}$	99. $85 \overline{)89.25}$	103. $25 \overline{)4.00}$

State 3 factors of each of these numbers:

104. 60; 120; 45; 27; 144; 90; 100.

105. 32; 16; 50; 105; 250; 84; 63.

Find:

106. $\frac{1}{6}$ of 54.	108. $\frac{1}{7}$ of 49.	110. $\frac{2}{3}$ of 21.	112. $\frac{2}{7}$ of 56.
$\frac{1}{9}$ of 63.	$\frac{1}{6}$ of 30.	$\frac{4}{5}$ of 45.	$\frac{7}{8}$ of 40.
$\frac{1}{7}$ of 42.	$\frac{1}{8}$ of 48.	$\frac{3}{7}$ of 42.	$\frac{3}{8}$ of 64.
$\frac{1}{9}$ of 54.	$\frac{1}{6}$ of 42.	$\frac{5}{6}$ of 36.	$\frac{7}{9}$ of 54.
107. $\frac{1}{9}$ of 81.	109. $\frac{1}{10}$ of 70.	111. $\frac{3}{5}$ of 35.	113. $\frac{3}{10}$ of 40.
$\frac{1}{7}$ of 56.	$\frac{1}{7}$ of 84.	$\frac{2}{9}$ of 81.	$\frac{7}{10}$ of 70.
$\frac{1}{7}$ of 63.	$\frac{1}{8}$ of 56.	$\frac{6}{7}$ of 63.	$\frac{8}{9}$ of 72.
$\frac{1}{5}$ of 35.	$\frac{1}{10}$ of 90.	$\frac{5}{8}$ of 32.	$\frac{11}{12}$ of 48.

114. $\frac{2}{5}$ of 725. 115. $\frac{2}{3}$ of 261. 116. $\frac{8}{9}$ of \$126.
 $\frac{4}{5}$ of 985. $\frac{3}{4}$ of 434. $\frac{2}{3}$ of \$7.50.
 $\frac{5}{6}$ of 636. $\frac{7}{8}$ of \$876. $\frac{4}{5}$ of \$4.25.
 $\frac{3}{4}$ of \$208. $\frac{3}{5}$ of \$985. $\frac{5}{6}$ of \$3.72.

117. Rule a table like the following and replace the question-marks by the required fractions:

Thus, the first question-mark in the top row stands for $\frac{2}{4}$, since $\frac{1}{2} = \frac{2}{4}$. The first question-mark in the second row stands for $\frac{2}{6}$, since $\frac{1}{3} = \frac{2}{6}$.

	4ths	6ths	8ths	9ths	10ths	12ths	14ths	15ths	16ths
$\frac{1}{2} =$?	?	?		?	?	?		?
$\frac{1}{3} =$?				?			
$\frac{1}{4} =$?						?
$\frac{1}{5} =$?				
$\frac{1}{6} =$?			
$\frac{1}{7} =$?		
$\frac{1}{8} =$?

118. What will the second line read if $\frac{1}{3}$ is replaced by $\frac{2}{3}$? The third line, if $\frac{1}{4}$ is replaced by $\frac{3}{4}$? Make and solve 4 other problems.

Reduce to lowest terms:

119. $\frac{8}{12}$; $\frac{14}{28}$; $\frac{16}{24}$; $\frac{9}{12}$; $\frac{25}{30}$; $\frac{18}{27}$.

120. $\frac{40}{60}$; $\frac{12}{48}$; $\frac{21}{77}$; $\frac{24}{96}$; $\frac{25}{100}$; $\frac{7}{35}$.

Express as common fractions:

121. 8.5 ; $.89$; $.05$; $.17$; $.40$; 1.05 .

122. $.25$; 6.25 ; $.95$; $.01$; $.9$; 9.7 .

Add:

123. $\frac{3}{4} + \frac{5}{6}$.

125. $\frac{8}{9} + \frac{2}{3}$.

127. $\frac{3}{8} + \frac{3}{4}$.

124. $\frac{5}{6} + \frac{2}{3}$.

126. $\frac{3}{4} + \frac{1}{14}$.

128. $\frac{5}{6} + \frac{8}{9}$.

Subtract:

129. $\frac{5}{6} - \frac{3}{4}$.

131. $\frac{8}{9} - \frac{2}{3}$.

133. $\frac{3}{7} - \frac{1}{14}$.

130. $\frac{5}{8} - \frac{3}{4}$.

132. $\frac{5}{6} - \frac{1}{3}$.

134. $\frac{7}{9} - \frac{5}{6}$.

Multiply:

135. $3 \times 9\frac{5}{6}$.

137. $12 \times 18\frac{4}{9}$.

139. $46 \times 25\frac{4}{5}$.

136. $20 \times 8\frac{1}{2}$.

138. $65 \times 40\frac{3}{5}$.

140. $75 \times 40\frac{2}{3}$.

Divide:

141. $\frac{8}{9} \div 4$.

143. $\frac{9}{10} \div 2$.

145. $\frac{9}{10} \div 3$.

142. $\frac{10}{17} \div 5$.

144. $\frac{5}{8} \div 5$.

146. $\frac{12}{16} \div 6$.

II

Write the tables of the following measures:

- | | | | |
|------------|------------|-------------|------------|
| 1. Liquid. | 3. Linear. | 5. Time. | 7. Weight. |
| 2. Dry. | 4. Square. | 6. Surface. | 8. Cubic. |

Add:

9. 8 yd. 2 ft. 6 in.

10. 40 gal. 2 qt. 1 pt.

7 1 9

36 2 1

Subtract:

11. 12 da. 18 hr. 50 min.

12. 40 bu. 3 pk. 6 qt.

6 20 55

25 0 1

Find the price per dozen if :

13. 37 doz. bars of soap cost \$18.50.
14. 1 gross of canned corn cost \$36.72.
15. 11 doz. water-glasses cost \$23.32.
16. 12 doz. cans of baking-powder cost \$43.20.

Solve :

17. Find the area of a rectangle whose base is 15 inches and whose altitude is 7 in.

18. In 1902 there were 25 Government schools for Indians with an attendance of 6,900. What was the rate of attendance per school?

19. The annual yield of a cork-tree is 45 lb. What will be the yield of a tree for 150 years?

20. One of the bridges between New York and Brooklyn is 9,335 ft. long. This is how many feet more than a mile (5,280 ft.)?

21. A troop of cavalry contains 18 officers, 8 workmen, and 43 privates. What is the total in a troop?

22. What does it cost at 2 cts. a mi. to ride from Buffalo to New York, a distance of 440 mi.?

23. A man plants a 6-acre field with cabbage and gets a yield of 16 tons per acre. How many tons of cabbage does he harvest?

24. He sells the cabbage for \$5 per ton, loaded on the cars. What does he receive for the crop?

25. He draws the crop to the station in loads of 3 tons each. How many loads are there? What is the cost of cartage at \$2.50 a load?

26. A car holds 16 tons. How many cars will be necessary to ship the crop?

27. It requires 5 thousand plants per acre to set the field. What is the cost of the plants at \$1 per thousand?

28. What is the cost of growing the cabbage at \$1.50 per ton?

29. The farmer who raised the crop paid \$10 rent per acre for the land. What is his profit on the whole crop when all expenses mentioned have been paid?

30. If he had sown the field with wheat, harvesting 30 bu. to the acre, what would the crop have been worth at 80 cts. a bu.? If his profit is $\frac{1}{8}$ of this amount, which crop is the more profitable?

31. Find out how much corn an acre of land usually produces and the price of corn per bushel. What would the yield of a 6-acre field be worth? Find the probable value of a potato crop on 6 acres.

32. A family of three order from the grocery in one week: $\frac{1}{2}$ bu. of potatoes at \$.60 a bu.; 1 sack of flour for \$.75; 10 lb. of sugar at 6 cts. a lb.; 4 lb. of butter at \$.25 a lb.; 2 lb. of lard at 10 cts. a lb.; 2 doz. eggs at \$.20 a doz.; 1 lb. of coffee at \$.40 a lb.; $\frac{1}{2}$ lb. of tea at \$.60 a lb.; fruits, fresh vegetables, and spices together, \$1. Make out the grocery bill and find its amount.

33. The same family buys at the meat market in one week: 2 lb. of beefsteak at \$.15 a lb.; a 6-lb. lamb roast at \$.18 a lb.; 2 lb. of pork-chops at \$.12 a

lb.; a 5-lb. trout at 10 cts. a lb., and a 4-lb. chicken at \$.14 a lb. Make out the meat bill and find the amount.

34. This family buys at the dry-goods store in one week: 4 yd. of toweling at \$.20 a yd.; 12 yd. of calico at 6 cts. a yd.; 6 yd. of cotton cloth at 10 cts. a yd.; and notions, \$.50. Find the amount of the dry-goods bill.

35. This family pays in one week for rent \$4; for fuel \$2; for lighting \$.50; for clothing \$4, and for other things \$2. Find the total expenses of this family for the week.

36. The income of this family is \$30 per week. How many dollars has this family left after paying all expenses for one week?

37. At this rate how many dollars can they save in one month? In one year?

38. How many years would it take them to pay for a home costing \$2,280?

39. Oliver has charge of a newspaper route having 40 customers. How many papers does he deliver in a month of 26 days?

40. If each customer pays \$.50 a month for his paper, how much does the newsdealer get per month from this route?

41. If Oliver gets \$.15 a day for his work, how much does he get per week? Per month?

42. How much is left for the dealer after having paid the newsboy?

43. If the paper costs the dealer 1 cent per copy, what is his profit on this route per month?

44. What would be the profit on 5 such routes yielding the same profit?

45. If Oliver also takes care of 3 sidewalks, receiving \$.15 a week for each, what does he receive in a month for cleaning walks?

46. If he does 5 errands per week at 5 cts. each, how much does he earn in a month in this way?

47. How much does Oliver earn in a week from his three kinds of work? How much does he earn in a month?

48. If he buys himself a suit of clothes costing \$4, how much has he left out of his earnings?

49. If he spends only \$2.40 a month for clothing, shoes, books, and other things, how many dollars does he save in 6 months?

50. Name three things that a girl can do and state how much she can earn in a week. In a month.

51. A school gave a play and charged 15 cts. admission; 450 tickets were sold; the expenses were \$15. How many dollars were made?

52. Express companies make special rates to manufacturers. If a manufacturer can thus send a pair of shoes by express for 10 cts. instead of the ordinary charge of 25 cts., how much does he save on 100 pairs?

53. It costs 25 cts. to send a telegram of 10 words from New York to Buffalo and 2 cts. for each additional word. What is the cost of a 16-word message?

54. A steamer that consumes 4 hundred pounds of coal per mile uses how many hundred pounds on a trip of 300 miles? How many tons is this?

55. It costs 25 cts. a word to cable from New York to London. What is the cost of a 25-word message?

56. In a 5-story building the floors are 15 feet apart, and an elevator runs to the top. If it makes 50 round trips in a day, how many feet does it travel?

57. A barrel of flour weighs 196 lb. If a sack of flour weighs 49 lb., how many sacks of flour in a barrel? How many sacks in a car-load of 120 bbl.?

58. If a gas-jet uses 7 cu. ft. of gas per hour, and a house has 15 such jets, how many cubic feet does it use in an hour? In an evening of 4 hours?

59. A mile contains 1,760 yd. How many feet are there in a mile? If there are 40 telegraph-poles to the mile, placed at equal distances apart, how many feet apart are the poles?

60. How far will a bicycle wheel 7 ft. around travel in making 125 revolutions?

61. A horse that travels 1 mile in 6 minutes goes how far in 1 hour?

62. $\frac{1}{2}$ of a 72-foot flagstaff was broken off. How many feet were left standing?

63. A school-ground containing 4,880 sq. ft., is 80 ft. wide. How long is it?

64. There are in a house 2 rooms 9 ft. by 12 ft., 3 rooms 15 ft. by 18 ft., 1 room 15 ft. by 21 ft., and 4

rooms 12 ft. by 15 ft. What is the total area of the floor surface.

65. What is the cost of lathing the side-walls and ceiling of a room 15 ft. by 12 ft. and 9 ft. high, at 10 cts. a sq. yd.?

66. What will it cost to plaster the same room at 25 cts. per yd., not allowing for windows or doors?

67. How many sheep will it take to produce a ton of wool at the rate of 5 lb. each?

68. A farmer has an orchard of 500 trees, which bear at the rate of 2 bbl. of apples per tree. If he gets \$3 per bbl. for the fruit, how much does the crop bring?

69. Lay two objects on the floor 5 yd. apart as nearly as you can judge. Then measure the distance and correct your estimate.

70. Lay two objects 7 ft. apart as nearly as you can judge, and test the result by measuring.

71. Draw a rectangle 1 ft. wide that has an area of $1\frac{3}{4}$ sq. ft. An area of $2\frac{2}{3}$ sq. ft.

72. Draw a rectangle 1 yd. long that has an area of $\frac{2}{3}$ of a sq. yd. An area of $\frac{3}{4}$ of a sq. yd.

73. If a line 1 in. long on a map represents 1000 mi., how many inches represent 3,500 mi.?

74. What unit may one use to measure the length of a pencil? The width of a page of this book?

75. What unit may one use to measure the length of a room? The height of a building? The length of a village block? The distance to a city?

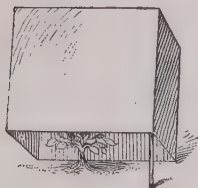
76. For what are the inch, foot, and yard used?

77. What unit may one use to measure the surface of a page of this book? The surface of a floor? The surface of a lawn? Of the street?

78. For what are the square inch, square foot, square yard, and square mile used? Units for measuring surface are called what kind of units?

79. What units measure volume? How do the length, breadth, and thickness of a cube compare?

80. What is the area of the entire surface of a cube, each of whose edges is 4 in. long?



81. Plants are sometimes covered to protect them from the sun or frost by a cubical cover 1 ft. each way. How many square feet of material are needed to make one cover, allowing 1 sq. ft. for the lapping of the corners?

82. How many such covers can be made from 72 sq. ft. of paper? From 48 sq. ft.? From 36 sq. ft.?

83. How many cubic feet are there in a vat 12 ft. long, 6 ft. wide, and 4 ft. deep? What is the cost of lining its sides and bottom with tin at 6 cts. per sq. ft.?

84. What is the cost of excavating a cellar 8 yd. wide, 14 yd. long, and 2 yd. deep at \$1 per cu. yd.?

85. If the drawer in the picture is 12 in. wide, 4 in. deep, and 18 in. long, how many 1-inch cubes will it hold? How many 2-inch cubes? 4-inch cubes?



86. Some beavers built a dam 50 yd. long. How many feet long was it? How many times the length of your schoolroom would this be?

87. How many steel rails 33 ft. long are there in a mile of railroad-track?

88. Two trains going in opposite directions leave Chicago at the same time, each going 35 mi. an hour. How far apart are they in 2 hr.? In 10 hr.?

89. Make a drawing for Exercise 88 to show the distance of the trains from Chicago at the end of each period of time. What length represents 35 mi.?

90. If two trains leave Buffalo at the same time and travel in the same direction, one at the rate of 45 mi. an hour, and the other at the rate of 30 mi. an hour, how far apart are they in 2 hr.? 10 hr.?

Make bills for the following, with yourself as purchaser and some firm that you know as seller:

91. January 17, 3 yards of flannel at \$.75; 6 yards of flannel at \$.68; 2 yards of flannel at \$1.12.

92. July 3, 11 yards of red bunting at \$.18 per yard; 14 yards of blue bunting at \$.17 per yard; 21 yards of white bunting at \$.19 per yard.

93. October 14, 14 feet of picture-molding at 4 cts. per foot; 3 dozen picture-hooks at 5 cts. per dozen; 2 dozen fancy knobs at 13 cts. each.

DENOMINATE NUMBERS

REFERENCE TABLES

Linear Measure

12 inches (in.)	= 1 foot (ft.)
3 feet	= 1 yard (yd.)
$16\frac{1}{2}$ feet	= 1 rod (rd.)
1,760 yards	= 1 mile (mi.)
5,280 feet	= 1 mile

Measure of Time

60 minutes (min.)	= 1 hour (hr.)
24 hours	= 1 day (da.)
7 days	= 1 week (wk.)
365 days or	
12 months (mo.)	= 1 year (yr.)

Liquid Measure

2 pints (pt.)	= 1 quart (qt.)
4 quarts	= 1 gallon (gal.)

Table of Counting

12 units	= 1 dozen (doz.)
12 dozen	= 1 gross (gr.)

Dry Measure

2 pints (pt.)	= 1 quart (qt.)
8 quarts	= 1 peck (pk.)
4 pecks	= 1 bushel (bu.)

United States Money

10 cents (ϕ , or cts.)	= 1 dime
10 dimes	= 1 dollar
100 cents	= 1 dollar (\$)

Measure of Weight

16 ounces (oz.)	= 1 pound (lb.)
100 pounds	= 1 hundredweight (cwt.)
2,000 pounds	= 1 ton (T.)

Square Measure

144 square inches (sq. in.)	= 1 square foot (sq. ft.)
9 square feet	= 1 square yard (sq. yd.)
$30\frac{1}{4}$ square yards	= 1 square rod (sq. rd.)
160 square rods	= 1 acre (A.)

Cubic Measure

1,728 cubic inches (cu. in.)	= 1 cubic foot (cu. ft.)
27 cubic feet	= 1 cubic yard (cu. yd.)

